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ABSTRACT

Part of an economic education series, the course package is designed to teach basic concepts and principles of microeconomics and how they can be applied to various world problems. For use with college students, learning is gained through lectures, tutorials, textbooks, programmed text, cases, and TIPS (Teaching Information Processing System). Time allotment is a 15-week semester. The guide is divided into nine parts. Part I describes the package, including distinguishing features, course content, teaching techniques, and organization. Part II presents the course management plan. Parts III through VI offer four course unit lectures which define, explain, and give examples of economic concepts, issues, and tools: demand; supply; and price and output determination in markets. Part VII contains multiple choice objective examination questions and answer keys for each unit. Part VIII introduces sample TIPS materials and nine case descriptions. TIPS is a computer based testing and evaluation system used by both teacher and student to diagnose student difficulties and prescribe remedies. Survey materials include educational objectives by topic, multiple choice questions and answer keys, sample student progress reports, and a summary for each unit. Case descriptions offer students practice in applying economic concepts. Part IX presents questionnaires for student information, continuous evaluation, and final evaluation, pretests of economics and basic mathematics comprehension, a psychological inventory, and a final examination testing microeconomics knowledge. (CK)

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HERIOT-WATT UNIVERSITY, EDINBURGH

The Micro Tips - Cases - Programmed Learning Course Package

THE ESMÉE FAIRBAIRN RESEARCH CENTRE
Department of Economics

SO 011 932

The Esmée Fairbairn Research Centre, TEFRC, was established in 1970 and grew out of the Economics Education Project which was concerned with analysing how economics was being taught in schools, polytechnics, colleges and universities in the United Kingdom. Since its establishment, the Centre has undertaken several studies in the United Kingdom and United States of America, focussing mainly on efficiency in higher education.

Beginning in 1975, the principal research activity of TEFRC will be evaluating the cost effectiveness of alternative systems of instruction in higher education and assessing the likelihood of their diffusion in different institutional settings.

The Research Centre is part of the Department of Economics at Heriot-Watt University. The Director is Professor Keith G Lumsden.

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The Micro TIPS - Cases - Programmed Learning Course Package

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*UK Version for Heriot-Watt University Students

1 Description of Course Package

1.1 Distinguishing Features

The principal distinguishing features of the micro course package are:

i) individualizing of student learning;

ii) fast processing of student learning data for efficient allocation of teaching inputs;

iii) integration of conventional and new techniques.

Individualization of student learning occurs through the use of

i) a programmed learning text in which the students are given instantaneous feedback on how well they are mastering fundamental concepts;

ii) TIPS which gives information to students, teaching assistants, and the instructor on student learning and which recommends reading materials and exercises in areas of weakness;

iii) cases and case analysis which allow students to apply fundamental concepts to real world problems and to compare their analyses to 'perfect' answers.

Student learning is measured by TIPS surveys, case analyses, and student questionnaires. Every week students receive individualized student reports within hours of taking a TIPS survey and also have returned, graded, their case analysis for that week. While information on student learning might cause the instructor to alter the content of a lecture, the principal use to which the student learning information is put is in tailoring reading assignments, exercises, and tutorials to individual student needs. For example, students performing badly in TIPS surveys are advised to attend remedial tutorials on the material surveyed. Additionally, case tutorials are assigned for those students having difficulty in applying the fundamental concepts. At the other end of the spectrum students performing well on the surveys are directed to more challenging assignments.

1.2 Course Content

This course concentrates on the basic concepts and fundamental principles of microeconomics and considers how these principles can be applied in various real world microeconomics problems. Table 1.1(1) contains the major core topics included in each course unit.

Table 1.1(1) Microeconomics Course Units

Micro Unit	Core Topics
1	Economic Concepts, Issues and Tools
2	Demand
3	Supply
4	Price and Output Determination in Markets
5	Market Equilibrium and Economic Efficiency
6	Organization of Industries
7	Income Distribution
8	Collective Action
9	International Trade

Section 3 of the appendix presents each of the Core Topics in detail.

1.3 Teaching Techniques

A mixture of conventional and innovative teaching techniques are used to develop analysis and application. The former include: lectures, tutorials, office hours, textbook, and outside readings. The latter include: programmed text, cases and TIPS.

1.4 Course Organization

The course is organized on the assumption of two hours of self study time by the student for each hour of class time during a 15-week semester of three contact hours per week.

Detailed syllabuses, including assignments, are distributed at the beginning of the course, office hours are posted, and each innovative technique is described in detail.

Each week students are given a TIPS survey and a case study to complete. The performance on each of these determines which tutorial(s), if any, the student is advised to attend. Students performing satisfactorily on both TIPS and cases are given optional additional readings. Any student may seek out the professor and/or tutor during office hours.

Economics comprehension in the course is measured by a final examination consisting of objective questions, cases, and essay questions. (A mid-term examination is available upon request.)

1.5 Experiment Requirements

To assess the efficacy of each of the teaching techniques on different types of students, it is necessary to collect data on student and teacher characteristics. Students will be given a pre-test in economics and asked to complete a psychological inventory. In addition they will be asked to complete questionnaires at the beginning, throughout and at the end of the course.

1.6 Impact on Pilot Institution

Heriot-Watt University will be the pilot institution for the micro course package. The beginning economics course consisting of one semester of microeconomics and one semester of macroeconomics is taught to approximately 300 students majoring in economics, business studies, finance, accounting and engineering. In a pre-pilot student survey (1976-77) a majority of the students stated that the conventional tutorials, which consisted of 8-10 students meeting with a teaching assistant one hour per week, were a complete waste of time and teaching resources, since typically the time was taken up in explaining a problem to one or two students. The conventional tutorial system will be replaced during the academic year 1977-78 by a remedial tutorial system. The introduction of cases and the concomitant grading will require additional faculty time but the net saving in teaching resources has been estimated at 15-20 faculty hours per week (300 students required 30 conventional tutorial hours per week; the remedial TIPS and case tutorials will require four tutorial hours; case grading will require 6-11 hours per week).

The opportunity cost of the 15-20 faculty hours saved is additional research time for the faculty or 5-6 new courses, assuming the new course produces as much learning and satisfaction as a conventional course would have produced.

The 1977-78 students will be compared to the 1976-77 students in terms of economics comprehension and questionnaire response.

2 Course Management Plan

To measure the efficacy of various teaching techniques on different types of students it is essential that a common core of economics materials is taught to all students involved in the experiment and that the teaching faculty adhere to a rigorous course schedule.

To achieve the former a detailed course outline including applications and examples has been prepared for the instructor. Section 3 contains the detailed course outlines for Micro Units 1-4, approximately one half of the course. The course management plan follows.

Course Management Plan

	Week 1		Week 2		Week 3	
	Lecture 1	Lecture 2	Lecture 3	Lecture 4	Lecture 5	Lecture 6
LECTURE CONTENT	Introduction and Overview Description of TIPS Description of Cases Student Factual Questionnaire	Pre-Test of Economics Psychological Inventory	Micro Unit 1: Economic Concepts, Issues and Tools 1.1 Scarcity and Choice 1.2 Preferences, Resources and Economic Efficiency 1.3 Marginal Analysis and Opportunity Cost	1.4 Different Economic Systems Micro Unit 2: Demand 2.1 The Concept of Demand 2.2 Influences on Demand 2.3 Assumptions in the Theory of Demand	2.4 Implications of the Assumptions 2.5 Individual Demand 2.6 Market Demand 2.7 Characteristics of Demand	Micro Unit 3: Supply 3.1 The Concept of Supply 3.2 Influences on Supply 3.3 Assumptions in the Theory of Supply 3.4 Implications of the Assumptions
READINGS	Lumsden, Attiyeh, Bach: Microeconomics, Ch 1 Samuelson: Economics, Ch 1		Microeconomics, Ch 2, 3 Economics, Ch 2, 3, 22 R.A Radford, The Economic Organisation of a Prisoner of War Camp		Microeconomics, Ch 4, 5 Economics, Ch 23 J.L Knetsch, The Demand for Outdoor Recreation Senate Sub Committee, The Demand for Automobiles	
TIPS	TIPS Survey 0 (Basic Mathematics)			TIPS Survey 1	TIPS Survey 2	
CASES			Case 1.1 Marginal Analysis and Noise Pollution		Case 2.1 Cash vs. Vouchers	
TIPS TUTORIALS		Remedial TIPS Tutorial (Basic Mathematics)		Remedial TIPS Tutorial (Basic Mathematics)	Remedial TIPS Tutorial: Micro Unit 1 (Additional TIPS Survey)	
Cases TUTORIALS					Case Analysis 1.1 Marginal Analysis and Noise Pollution (Additional Case 1.2 The Cost of Re-training)	

	Week 4		Week 5		Week 6	
	Lecture 7	Lecture 8	Lecture 9	Lecture 10	Lecture 11	Lecture 12
LECTURE CONTENT	3.4 (cont'd) Implications of the Assumptions 3.5 Firm Supply in the Short Run	3.5 (cont'd) Firm Supply in the Short Run 3.6 Industry Supply in the Short Run	3.7 Firm Supply in the Long Run 3.8 Industry Supply in the Long Run 3.9 Characteristics of Supply	Micro Unit 4: Price and Output Determination in Markets 4.1 The Concept of a Market 4.2 Market Demand and Supply	4.3 The Operation of Markets 4.4 Change in Market Equilibrium 4.5 Intervention in the Market	4.6 Dynamic Adjustments in the Market Student Questionnaire Continuous Evaluation of Teaching Techniques
READINGS	Microeconomics, Ch 5, 6 Economics, Ch 27 T Kempner, Prices in Laundrettes Business Week, Marginalism in the Air		Microeconomics, Ch 7, 8 Economics, Ch 24		Microeconomics, Ch 8 Economics, Ch 4, 20 K J Arrow and W C Capron, The Dynamics of the 'Shortage' of Engineers and Scientists Ali M Khusro, The Pricing of Food in India	
TIPS	TIPS Survey 3		TIPS Survey 4		TIPS Survey 5	
CASES	Case 3.1 Production Decisions for the Jewellery Manufacturer		Case 3.2 The Empty House		Case 4.1 President Carter's Proposals on Gasoline Taxes and Rebates	
TIPS TUTORIALS	Remedial TIPS Tutorial: Micro Unit 2 (Additional TIPS Survey)		Remedial TIPS Tutorial: Micro Unit 3.1 - 3.6 (Additional TIPS Survey)		Remedial TIPS Tutorial: Micro Unit 3.7 - 3.9 (Additional TIPS Survey)	
Cases TUTORIALS	Case Analysis 2.1 Cash vs. Vouchers (Additional Case 2.2 Demand for Bus Travel)		Case Analysis 3.1 Production Decisions for the Jewellery Manufacturer (Additional Case 3.3 The Candy Bar Concession)		Case Analysis 3.2 The Empty House (Additional Case 4.2 Housing in Southern California)	

3 Course Unit Outlines and Question Banks

The course outlines have been prepared in considerable detail so that no ambiguities can exist in the concepts which must be included in the course. In addition, to assist the instructor, examples and applications of each concept have been added; the instructor may substitute his own examples but should not omit any of the topics. An objective examination question bank has been developed for each of the units. Each question is designated by detailed micro unit topic. These questions will be used for the TIPS surveys and a sample will be included in the final examinations.

MICRO UNIT 1

ECONOMIC CONCEPTS, ISSUES AND TOOLS

1.1 Scarcity and Choice

1.2 Preferences, Resources, Exchange and Economic Efficiency

1.3 Marginal Analysis and Opportunity Cost

1.4 Different Economic Systems

1.1 Scarcity and Choice

1.1.1 All living creatures have wants which they attempt to satisfy.

Example. The white shark wants food for survival. It attempts to satisfy this want by preying on most creatures which swim in the ocean. Some shark hunters, in turn, kill sharks as a means of livelihood. Others hunt sharks to satisfy their wants - the thrill of a dangerous chase or the mounting of a trophy.

1.1.2 In studying economics we do not question how human wants are determined. Whether human wants are determined by the need to survive, e.g. bread and water, the desire for pleasure, e.g. caviar and champagne, gluttony, e.g. Roman style eating orgies, or by other motives is not a primary concern of an economist.

Example. If we observe a family purchasing a third television set we accept as a fact that the family wants a third television set and is willing to pay the price of that set. In their professional capacity economists do not concern themselves with whether the family should want to buy a third television set.

1.1.3 The study of societies, their wants, their values, their morals, their behaviours, are undertaken by other disciplines, for example sociology and psychology. Economists, in contrast, in their discipline, start from a position in which wants and values are given or accepted and not questioned.

Example. Why a tribal chief wants 100 wives is a problem which may be studied by anthropologists. How many wives a chief can afford or under what conditions a chief would be better off with 97 rather than 100 wives are problems which could lie in the economist's domain.

1.1.4 Wants are not limited to basic subsistence items but include housing, clothing, food, transportation equipment, recreation, art, etc., over and above what is needed to sustain human life.

Example. Many families maintain well stocked refrigerators and freezers since friends may come over to watch Monday night football games and children seem continually to want snacks. The fact that some of the food from the refrigerator may finish up in the garbage does not necessarily imply bad housekeeping, e.g. a family may want to have a variety of food available/

available at all times knowing full well that not all of it will be consumed.

Similarly, if you go back in time in this country, you will find that many large families were raised in houses/apartments consisting of two rooms and a kitchen with an outside toilet. Similar conditions, incidentally, remain true for the majority of families in the world today in less developed countries. For most families in the United States today, houses are much more spacious and convenient and meet more than basic shelter requirements.

1.1.5 While certain individuals in the world today may claim that their wants are fully satisfied, no nation makes such a claim. The prevailing view is that as fast as most people satisfy certain wants, new wants emerge and will always continue to emerge. To the extent that this is true, it can be concluded that human wants are insatiable.

Example. Despite having one of the highest living standards in the world, most American families aspire to even higher living standards, e.g. they may want better health care, a swimming pool, a racing yacht, university education for their children or more vacations.

1.1.6 The more people consume of the goods (e.g. cheese and wine) and the services (e.g. hair cuts and college lectures) they want, the better off they become. Becoming better off is expressed by economists in a variety of ways, such as increasing the level of total satisfaction or total utility or total welfare.

Example. After a hard tennis match on a hot summer day you become better off with a glass of water or better still (?) a can of beer, i.e. your level of welfare or utility rises.

1.1.7 It is not difficult to think of situations in which consuming more of a good in some time period does not make an individual better off but actually makes him worse off, i.e. in which the consumption of additional units of a good decreases total utility.

Example. Forcing someone to eat cheesecake, normally enjoyed, until that person was sick would be a case of more of a good lowering an individual's utility level. For the present we shall assume the statement in 1.1.6 is true, i.e. individuals will consume more of a good only if it increases their utility.

1.1.8/

1.1.8 How fully an individual's or society's wants can be satisfied will be determined by the ability of the individual or nation to provide the items which satisfy their wants.

Example. In prisoner of war camps in Germany in World War II relatively few of the prisoners' wants were satisfied. Many prisoners starved to death and many died from disease because insufficient food and medical supplies were available to satisfy basic needs necessary for survival.

1.1.9 Items which help satisfy human wants may be provided by nature or may require effort on the part of individuals to provide them.

Example. Sunset over the Rockies satisfies some individuals' wants but is provided by nature without individual effort. On certain tropical islands coconuts are provided by nature but require some human effort to harvest and eat. At the other extreme considerable co-ordination of effort on the part of many thousands of individuals is required to produce an automobile or put a satellite around Mars.

1.1.10 The ability of individuals or nations to provide the goods and services which help satisfy wants is limited by the resources under their command.

Example. Most students cannot earn A's in all their subjects because of various limitations, e.g. the amount of time available for study. People in many under-developed countries have low life expectancies because of inadequate supplies of food and medical supplies.

1.1.11 A resource is defined as anything which helps produce the goods and services people want.

Example. The wheat farmer's fields are resources, as are his tractors, fertilizer, seed, etc., all of which are required to produce wheat which people want. Similarly the owner of a professional football team requires resources to produce football games which people pay to attend. These resources include a stadium with lights, team doctors and trainers, administrative staff, and football players, including the reserve quarterback who may sit out the season on the bench. To provide students with a university or college education requires buildings, professors, chalk, textbooks, etc., and a significant input of students' time, another resource.

1.1.12/

1.1.12 The dual existence of insatiable wants and limited resources produces what economists call the fundamental fact of scarcity.

Example. Scarcity would cease to exist only if every want could be fully satisfied. This would mean no resource limitation given these wants. If wants on a South Sea island consisted of dates, coconuts, fish and warm sunshine, and if all of these were available in unlimited quantities without any human effort, scarcity would not exist on the island. No one would work and everything would be free.

1.1.13 Because of scarcity all individuals and nations face the same problem: the allocation of limited resources among the many goods and services people in these nations desire.

Example. A household has to decide how to allocate its income among food, clothing, health services, education, transportation, leisure activities, etc. A nation has to decide how to allocate its labor force, lands, factories and other resources among defense goods and services (e.g. B52s, nuclear submarines, army, navy and airforce personnel), health services (medical schools, hospitals, kidney machines, VD clinics), educational services (kindergarten schools, universities, audiovisual equipment, computers, professors), transportation services (highways, aircraft, automobiles, railways), food and drink (wheat, soya beans, steak, pork, bourbon, beer), etc.

1.1.14 Economics is the study of how individuals and nations use resources under their command to satisfy their wants as fully as possible, i.e. to maximize their satisfaction, their utility or their welfare given their resource constraint.

Example. How a student decides to allocate study time among various subjects, how the C.I.A. and K.G.B. decide to allocate their agents to various pursuits, and how General Motors decides to allocate factory space, machine tools and employees to different types of automobiles, are all part of the study of economics.

1.1.15 Economics, therefore, is concerned with scarcity and choice. Scarcity exists because insufficient resources exist to satisfy all wants fully. The need for choice arises because resources allocated to the satisfaction of one want, by definition, cannot be available to satisfy other wants simultaneously.

Example. A child with only 10c. to spend in the candy store has a resource constraint, i.e. 10c. The child has a choice problem because he/she may want many different types of candy but/

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but can only afford one 10c. candy bar. Similarly every hour the President of the United States allocates to dealing with foreign policy is an hour less available for domestic policy, re-election, skiing or growing peanuts.

1.1.16 Every individual and society is continually confronted with scarcity and the need for choice.

Example. A multi-millionaire has only 24 hours in each day to be allocated to various pursuits: sleeping, eating, money making. Dwellers in a non-money-using commune with free access to one field must decide how much space to allocate to growing beans, how much to allocate to corn and how much to leave in grass.

1.1.17 While every individual and nation faces the fundamental problem of scarcity and choice, some specific wants can be satisfied without the need for choice. This is possible only when resources required to produce continuously those goods which satisfy such wants are not scarce. Such goods are known as free goods.

Example. Fresh air in the Scottish Highlands is sufficiently plentiful to satisfy fully local residents' wants for fresh air. Fresh air in the Scottish Highlands is a free good therefore.

1.1.18 The fact that resources such as air, water and sunshine, in aggregate, may be in almost limitless supply does not mean that to particular individuals, regions, or countries, they are free goods, i.e. that they are not part of the fundamental economic problem. These bounties of nature are required at different times, in different locations and in different amounts. Resources may be required to accommodate these time, location and quantity needs and since the use of such resources requires choices to be made, economics is concerned with the allocation of free goods.

Example. In many countries of the world there is a sufficient rainfall to provide for agricultural needs without human effort. In other countries, and in parts of our country, such conditions do not prevail. There, water has to be stored, piped and sprinkled in fields, i.e. it becomes a scarce resource and the human effort and other resources required to place the water in the right place at the right time means that these resources and the water itself are not available for alternative uses. In Europe in 1976 water supplies were so limited that many families were allowed two bucketsful per day - domestic supplies were cut off and families had to go to public taps for their bucketfuls. These families were faced with an allocation problem and as you might suspect many English gardens became barren. The Wimbledon tennis courts became dust bowls and there were a lot of dirty automobiles on the highways.

1.2 Preferences, Resources, Exchange and Economic Efficiency

1.2.1 To satisfy wants as fully as possible, given limited resources, individuals and nations must make choices. The best, or most efficient, choice is that which maximizes utility, i.e. satisfies wants as fully as possible, given the resource constraint.

> *Example. If you want to have as high a GPA as possible and have 30 hours of study time each week (time constraint), you have to decide how to allocate that study time to different subjects. The allocation (e.g. 8 hours to economics, 12 hours to philosophy, 6 hours to mathematics, and 4 hours to French) which yields the highest GPA is the most efficient allocation. Any alternative allocation which yields a lower GPA is, by definition, inferior and does not constitute the best use of the 30 hours study time.*

1.2.2 Since it is not possible to satisfy fully all wants, to achieve the highest level of utility possible from given resources, priorities must be assigned to the potential sets of goods and services which could be made available.

> *Example. In deciding how to spend the weekly budget a household will choose that bundle or set, from the infinite number of possible sets, of goods and services which will provide the highest possible level of utility. The set chosen compared to all the sets rejected will reflect the preferences of the household.*

1.2.3 If a given amount of goods were randomly allocated among a group of individuals it might be possible to increase utility levels without increasing the amount of goods through voluntary exchange.

> *Example. During World War II prisoners in German prison camps sometimes received Red Cross parcels containing tinned milk, jam, butter, biscuits, bully, chocolate, cigarettes, etc. Each prisoner received an identical package but each prisoner had his own individual preferences. Prisoners who did not smoke but liked chocolate could raise their utility levels by exchanging cigarettes for chocolate with prisoners who smoked but did not like chocolate. Note: both groups could become better off through exchange without any increase in the total amount of chocolate and cigarettes.*

1.2.4 By exchanging a good with a low level of utility for a good with a high level of utility an individual can increase his total utility level. Ultimately a point will be reached where all possible exchanges/

exchanges which can increase utility will have been made. Then utility can be increased only if additional goods or resources become available.

Example. Once the prisoners in 1.2.4 had exchanged goods until no two prisoners were willing to make any further exchanges, utility levels would increase only if more food parcels were given out.

1.2.5 Similarly, international trade in today's world allows nations to increase their level of wellbeing by exchanging goods.

Example. The United States exports electronic calculators to Scotland and imports Scotch whisky from Scotland. Both countries benefit from the exchange.

1.2.6 Which set of goods and services, from the feasible sets, an individual or nation chooses will be determined by preferences. The feasible sets will be determined by available resources.

Example. About 50 years ago the Russian leaders made a momentous decision. To enable Russia to become a great power they stated it was necessary to allocate a large percentage of its resources to the making of more resources, i.e. to the making of factories, machine tools, transportation equipment, etc. This meant allocating fewer resources to the production of food, clothing and shelter. Their choice reflected their preferences. The various options available from which to make this choice were limited by total Russian resources. Had more resources been available Russia could have become a great power without the sacrifice of many thousands of lives caused by insufficient food, clothing and shelter.

Example 2. The average U.S. family with an annual income of $12,000 has many options in terms of food, clothing, housing, recreation, etc. from which to choose. Its choice reflects its preferences. The few families with annual incomes in excess of $1,200,000 have wider choices which include everything the average family can afford but which may also include yachts, jets, European vacations and private education for their children. Again their choices reflect their preferences.

1.2.7 The greater the amount of resources a nation has the larger and more varied will be the sets of goods and services which can be produced.

Example. Today Kenya cannot produce the number and variety of automobiles, aircraft and university graduates and all other goods and services that the U.S. can, because Kenya does not have as many resources as the United States.

1.2.8 In addition, the better the production techniques, given an amount of resources, the larger will be the amount of goods and services which can be produced.

> *Example. U.S. agricultural experts have stated that the size of many USSR collective farms is too large for efficient management, and if U.S. management techniques were adopted in Russia total Russian agricultural output could be increased with the same or fewer resources.*

1.2.9 It is in the interest of a nation to use as few resources as possible in the production of any one good. The fewer the resources employed in producing a given amount of a good, the greater will be the resources available for the production of other goods, and, consequently, the more fully wants can be satisfied.

> *Example. In building a bridge over a river there is a minimum amount of steel necessary to ensure that the bridge will not collapse when fully utilised. However, it would be a complete waste of steel to keep adding support structures to that bridge to bear, say, 1000 Sherman tanks if no Sherman tank will ever use it, since the steel has many alternative uses, e.g. another bridge over another river.*

1.2.10 The term engineering or technical efficiency describes a situation in which a given amount of a good is produced using the fewest resources possible. Alternatively, engineering efficiency can be defined as maximum output for a given amount of resources. Note the good in question must be of stated quality; the resources required to produce a low quality item cannot be compared in this situation with the resources required to produce a high quality good.

> *Example. A farmer, with a given field, seed, agricultural equipment, weather and fertilizer, wants to achieve maximum wheat yield from that field. There is an infinite number of ways he can allocate the fertilizer over the field. He could dump it in one corner or in the four corners or spread it thickly over one-third of the field only or he could allocate it evenly over the whole field. The reason he chooses the last named option is because logic and experience suggest that this resource (fertilizer) allocation will yield him the largest crop, i.e. that this will be the best or most efficient allocation of the fertilizer.*

1.2.11 The concept of economic efficiency is more complex than the concept of engineering efficiency. To have an economically efficient allocation/

allocation of resources, not only must the least amount of resources be allocated to the production of each good and service, i.e. engineering efficiency, but the set of goods and services produced must be that set which satisfies wants as fully as possible, i.e. no other feasible sets of goods and services could yield a higher level of welfare.

> *Example. A town could build 100 bridges in a manner which was efficient from an engineering viewpoint, i.e. using the least amount of resources for 100 bridges, but could be allocating resources poorly from an economic efficiency viewpoint. This would be the case if bridges yielded less satisfaction than other goods which could have been produced with the resources used for all or some of the bridges. If building 100 bridges, however, did constitute an economically efficient allocation of resources, e.g. in Venice, it would mean that not only was each bridge constructed in an engineering efficient fashion, but that the alternative goods foregone yielded less satisfaction than the 100 bridges.*

1.3 Marginal Analysis and Opportunity Cost

1.3.1 One possible way to solve problems in which economic efficiency is the goal (see 1.2.11) is to consider the potential welfare from every possible resource allocation and choose that allocation which yields the highest welfare.

Example. The following table shows the points a student will achieve in a 2 hour economics final examination for different allocation of time between objective questions (maximum 35 points) and essay questions (maximum 65 points). In this example the limited resource is 2 hours of examination time, the goal is total points maximization, and the choices are different allocations of time to objective and essay questions.

Objective Questions		*Essay Questions*		*Total Points*
Time Spent	*Points*	*Time Spent*	*Points*	
120	*33*	*0*	*0*	*33*
100	*32*	*20*	*23*	*55*
80	*29*	*40*	*38*	*67*
60	*25*	*60*	*48*	*73*
40	*20*	*80*	*55*	*75*
20	*11*	*100*	*58*	*69*
0	*0*	*120*	*60*	*60*

Total points score is at a maximum when 40 minutes are allocated to objective questions and the remaining 80 minutes allocated to essays. Since no other allocation yields a higher total this is the most efficient use of the two hours time.

1.3.2 The disadvantages of the approach in 1.3.1 are first, it may not be feasible always to consider every possible allocation of resources and, second, the calculations could be very time-consuming.

Example. A student, in deciding how to allocate non-class time in a given week, typically has an infinite variety of choices within a time constraint. The act of trying to record all possible permutations on paper, e.g. 84.3 minutes eating + 169.2 minutes playing tennis + 112.6 minutes studying, etc. v. 83.3 minutes eating + 170.2 minutes playing tennis + 112.6 minutes studying, etc., would require a lifetime.

1.3.3 An alternative way to find the optimal allocation of a limited resource, or resources, is to start with a particular allocation and to determine how total utility or welfare changes as the allocation of the resource changes. If total utility increases because/

because of the change in the allocation, then the change should be made. If there is no change in the allocation which will increase utility, then the optimal allocation already exists.

> *Example. In example 1.3.1 select the allocation 80 minutes on objective questions yielding 29 points and 40 minutes on essay questions yielding 38 points. For the allocation of time to be optimal no change in allocation will increase total points.*
>
> *Consider a marginal decrease in time allocated to objective questions and a corresponding marginal increase in time allocated to essay questions, 20 minutes less allocated to objective questions costs the student 4 points on objective questions but 20 minutes more allocated to essay questions gains the student 10 points on essay questions. The net gain in points (utility) of 6 (10 - 4) is positive, indicating that the change should be made, i.e. 60 minutes objective, 60 minutes essay is a superior allocation to the initial 80 minutes objective, 40 minutes essay, but is 60, 60 optimal? A further incremental change to 40 minutes objective and 80 minutes essay yields a net gain of 2 points, but a further change lowers total points by 6. Thus 40 minutes objective, 80 minutes essay is the optimal allocation of time.*

1.3.4 In starting from an initial resource allocation and making a marginal change in that allocation benefits and costs (gains and losses) occur. The gain from the marginal change is called the marginal benefit. The loss from the change is called the marginal cost.

> *Example. In example 1.3.1 when fewer minutes were allocated to objective questions the marginal cost was the decrease in points on objective questions. When these minutes were allocated to essay questions the marginal benefit was the increase in points on essay questions.*

1.3.5 An action, activity or resource reallocation where marginal benefits exceed marginal costs will, if undertaken, result in an increase in utility or wellbeing.

> *Example. In example 1.3.1 starting with any time allocation other than 40 minutes objective and 80 minutes essay, and changing the time allocation in direction of 40 minutes objective and 80 minutes essay, will be an activity in which marginal benefits will exceed marginal costs and will yield a higher points score.*

1.3.6/

1.3.6 The technique of considering incremental changes in resource allocation and weighing the marginal benefits and marginal costs is known as marginal analysis. Marginal analysis therefore is a useful technique for solving problems involving optimization. Because optimization problems in economics contain constraints (e.g. incomes, time, etc.) they are often called constrained maximization problems. In analyzing such problems marginal analysis is used widely by economists and other decision makers.

> *Example. An egg farmer whose goal is to maximize profits from his egg farm has an optimization or constrained maximization problem. He can vary, within limits, the amount of food per chicken, the temperature and humidity levels within each building, the size of each chicken cage, etc., and continue to produce eggs. If he were to lower the temperature by 1 degree he might save $30 on heating costs, but if egg production were to fall as a result, by 2000 eggs, each worth 2c. to him, the net loss would be $30 - (2000 x 2c.) = $10. A farmer in making such calculations to achieve the goal of profit maximization is using marginal analysis.*

1.3.7 Marginal analysis can be critical in optimal allocation decisions both for an individual and a society. The fact that total benefits from an activity exceed total costs does not imply that an activity should necessarily be undertaken.

> *Example. A nation in considering an extension of its highway system must decide if the benefits from an additional mile of highway outweigh the costs of the additional highway. Consider the table below:*

	Extension of Highway				
	1 mile	*2 miles*	*3 miles*	*4 miles*	*5 miles*
Total Benefit ($m)	.2	.5	.9	1.2	1.3
Total Cost ($m)	.1	.2	.4	.6	.8

> *An engineer has produced the above data on total benefits and total costs of a 1 mile, 2 miles, 3 miles, 4 miles and 5 miles highway extension.*

> *One might conclude that the 5 miles extension should be built because total benefits ($1.3m) exceed total costs ($.8) and this, therefore, must be an efficient way to allocate resources. The marginal approach showed the error in this logic*

> *For the first mile total and marginal benefits are equal ($.2m) as are total and marginal costs ($.1m). Since marginal benefits exceed marginal costs the first mile should be built.*

Consider adding a second mile. Here the marginal benefits are \$.3m (\$.5m - \$.2m) and the corresponding marginal costs \$.15m (\$.25m - \$.1m). Thus the second mile is worth adding. Similar analysis holds for the 3rd and 4th miles. However, for the 5th mile the marginal benefit is \$.1m (\$1.3m - \$1.2m) and the marginal costs \$.2m (\$.8m - \$.6m). Since the marginal cost exceeds the marginal benefit the activity, the building of the 5th mile of highway, should not take place despite the fact that the total benefit of 5 miles of additional highway exceeds the total cost. Only 4 miles of additional motorway should be built.

1.3.8 In determining the best use of resources the alternative goods, or outputs, which could be produced must be considered, i.e. the different opportunities for any resource must be evaluated.

Example. The opportunities to which uncommitted hours of a student's time could be allocated during a week typically are considerable, e.g. jogging, studying, watching TV.

1.3.9 In allocating a resource to any one activity, all alternative uses of that specific resource, by definition, are sacrificed.

Example. A student allocating 2 hours to jogging is giving up 2 hours of TV watching or studying.

1.3.10 The best alternative foregone is the cost of any activity or resource allocation. Economists call the best alternative foregone the opportunity cost of the activity undertaken.

Example. A town in Oregon with adequate natural water supplies has resources to build an additional school or an additional hospital, but not both. It decides to build the school since it concludes that the marginal benefits for a school exceed the marginal benefits for a hospital. The opportunity cost of this school is the hospital, i.e. the best alternative foregone. Note that while the same resources (same amount of money) could be used to build a dam, this is a distinctly inferior alternative to the hospital since the town has an ample water supply. Thus the opportunity cost of the school is not the dam, which would provide too low a cost assessment, but the hospital since it is the best alternative to the school.

Example 2. Note in the table in 1.3.1 when 80 minutes were being allocated to objective questions, the marginal cost of a 20 minute decrease in time allocated to objective questions was 4 points, i.e. 29 - 25. The opportunity cost of these 20 minutes allocated to objective questions, however, was the best alternative/

alternative foregone, i.e. 20 minutes allocated to essay questions worth 10 points.

In this example the opportunity cost of any time allocated to objective questions is the points foregone for essay questions and conversely the opportunity cost of any time allocated to essay questions is the points foregone for objective questions.

1.4 Different Economic Systems

1.4.1 Any nation or society, irrespective of political ideology, has to decide how to allocate the scarce resources under its command to satisfy wants as fully as possible. Thus any nation has to decide, given its resource constraints and within a given time period:

1) what goods and services to produce

2) how those goods and services are to be produced, i.e. the problem of engineering efficiency (1.2.10)

3) how those goods and services are to be distributed among the population.

Example. Each nation or society has to decide what types of educational services to provide for its people. Should it provide more or less elementary education, more or less college education, more or less adult education?

Second, each has to decide how to 'produce' education. Should there be large classes or small classes, should students be taught by professors and teaching assistants 10, 11, 12 ....20 hours per week, should computer assisted instruction, programmed learning, and case studies be used, should colleges remain open 12 months per year, or should universities and colleges be abandoned and lectures given by national television?

Third, each nation has to decide who is to receive the educational services. Should the more intelligent members of society receive more education than the less intelligent or vice versa? Should the poor or the rich receive most of the education or should everyone attend the same number of lectures in selected subjects? Or should education be treated like beer: those who want it should pay for it?

1.4.2 There are three methods of solving each of the three fundamental problems: by tradition, by command, and by markets.

1.4.2.1 The traditional solution:

The set of goods and services to be produced is largely determined by social, religious and/or other customs established over time. Changes in output are caused chiefly by the vagaries of nature.

The methods of production are laid down by social custom and habits developed over time.

The distribution problem is solved according to birth right and other social factors, and it is normally not possible for the individual to alter his well being or position in the social hierarchy through his own efforts.

Example. In feudal times, societies tended to be organized around the Manor House and engaged in little trade with other societies. Customs largely determined what to produce; these customs had their basis in survival needs and much economic activity involved ensuring that adequate supplies were available in the winter months.

How goods and services were produced was determined by assigning specific individuals to tasks. The methods employed did not change much over time. The vagaries of nature, such as plagues and bad weather, produced the most important variations in output.

The distribution of income was determined by the individual's position in society, i.e. whether he was the Lord of the Manor, a member of the Clergy, or one of the various types of workers.

A further example of traditional organization is found in the animal kingdom. The Tundra wolves typically lay claim to a certain territory and hunt caribou. Certain wolves hunt, and within the hunting pack individual wolves perform specific tasks such as herding the prey and killing it. The distribution of the kill is determined by the status of individual wolves; some have first choice, others are detailed to carry meat to the pregnant females, and so on.

1.4.2.2 The command solution:

The set of goods to be produced is determined by an individual or central ruling body. Once the set has been determined it is treated as a target and a plan is drawn up to implement the choice decision. The plan is typically for a five year period.

The methods of production are determined by available information on the engineering efficiency of different resource combinations and different amounts of resources are allocated to each industry. Some allowance is made normally for individuals and managers to adjust the deployment of resources in the interests of increasing output.

The distribution problem is solved by stipulating wage or salary levels for different types of worker and prices of goods and services on the basis of predetermined criteria, e.g. equity.

> *Example. In communist countries most economic activity is determined by central planning committees. Plans are drawn up on how many units of each good should be produced, and the plan is subject to alteration in the light of experience. Resources are allocated in accordance with the plan and managers are given responsibility for pursuing targets. Most wages, salaries, and prices are set in advance in the overall context of the plan.*

1.4.2.3 The market solution:

The set of goods and services is determined by the interaction in the market of consumers who are willing to pay for them and producers who are willing to supply them in response to market prices.

The methods of production are determined by the forces of competition among producers who hire resources to produce different goods and services using the least input of resources, i.e. in a manner which is efficient in the engineering sense.

The distribution problem is resolved by how incomes are determined through markets. Individuals having resources which earn higher returns in resource markets will have higher incomes and consequently be able to buy a larger amount of goods and services than individuals with fewer resources or ones which earn lower returns in resource markets.

> *Example. Many students allocate part of their incomes to hamburgers and milkshakes. There exist around campuses firms who supply hamburgers and milkshakes using certain resources. Some firms build stalls, buy equipment to cook hamburgers and mix milkshakes, and employ people to serve customers. In turn the money paid by these firms for the resources becomes an income to people supplying these resources. The competition among people wishing to buy hamburgers and milkshakes and the firms which supply them determines the price of hamburgers and milkshakes and also helps determine the returns to the resources employed.*
>
> *It is the joint interaction of people buying and selling that constitutes the market through which allocation decisions are made. Note that in any market there is competition among buyers as well as sellers; for example, when an object is put up for sale by auction, competition is confined to the buyers.*

1.4.3 The following table summarises the characteristics of the three solutions to the economic problem. Each of the three solutions is conceptual and does not necessarily apply in a pure form to real life situations.

Table 1.4.3(1) How the Resource Allocation Problem is Solved

Economic Problems Solution	WHAT TO PRODUCE Determined by:	HOW TO PRODUCE Determined by:	FOR WHOM TO PRODUCE Determined by:	RESOURCE OWNERSHIP
TRADITIONAL	Custom, tradition, culture, religion, etc.	Convention, existing technology.	Individuals' position in the social system, usually based on birth, family ties, etc.	Private individuals, society, or both.
COMMAND	A central planning organisation, making judgements about individuals' preferences.	A central planning organisation, choosing the resource combination and production technique for each area of activity.	Distribution of individuals' incomes, the levels of which are set by a central planning organisation.	The State
MARKET	Individuals expressing preferences by allocating incomes on desired goods and services, and firms responding by producing such goods and services.	Firms competing with each other to produce goods and services using the least amount of resources, the prices of which are set by market forces.	Distribution of individuals' incomes, the levels of which are set by market forces	Private individuals

1.4.4 All nations use different combinations of the three solutions in resolving the problems of what, how and for whom to produce.

Example. Within U.S. households much economic activity operates under the traditional mode. In many families decisions on consumption are made by the parents. One parent earns income while the other runs the household; a set portion of income is shared among family members to spend as they wish. Under the command mode, the government decides how many Chieftain tanks will be produced, who will produce them, and who will be defended by them, i.e. specific groups or the nation as a whole. Under the market mode, the interplay of buyers and sellers determines how many hamburgers and milkshakes will be produced and, simultaneously, how resource owners will be rewarded.

1.4.5 Societies are classified normally as traditional, command or market, according to the type of solution predominantly used to allocate resources. The concomitant of how resources are allocated is resource ownership. In market economies resources are owned by individuals, in command economies by the state, and in traditional economies by both the state and individuals.

(Market economies are also described as 'capitalist' and 'free enterprise'. In the following the phrase 'market' only is used.)

Example. The U.S. is conventionally classified as a market economy because, first, the prices of most goods and services and resources are determined by market forces, and second, the majority of resources are owned by private individuals. In the U.S. economy the traditional sector is confined almost entirely to organization within the household. There is, however, a significant amount of economic activity accounted for by government; it produces approximately 10% of output, such as education, and buys approximately 20% of output, such as tanks. In addition, it regulates prices, employment conditions, advertising, etc., in many private enterprises. Because of this the U.S. is also described as a mixed free enterprise economy or mixed private enterprise economy.

The United Kingdom and Sweden are also classified as mixed free enterprise economies, although the share of economic activity accounted for, and resources owned by, their governments is significantly higher than in the U.S.

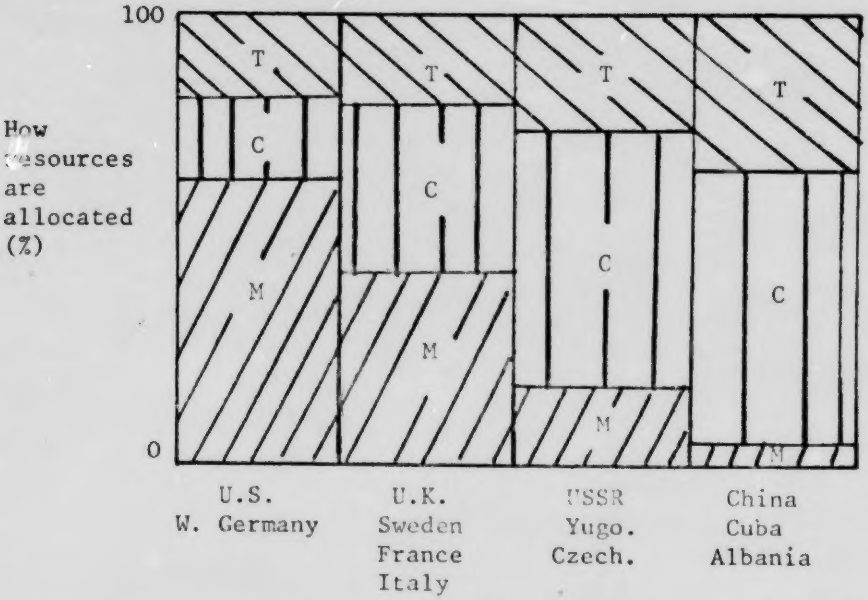
By contrast, government in the USSR largely determines what commodities are produced and most resources are state-owned. Despite the fact that individuals in the USSR have substantial freedom to allocate their incomes on any available goods, and that in the agricultural sector about 30% of output is produced privately/

privately, the USSR is normally classified as a command or centrally-planned economy.

The Peoples' Republic of China is another example of an economy normally classified as a command or centrally-planned system since a group of central planners attempt to set and enforce targets for most agricultural output and production goals for state-owned industries which account for most industrial output. There are also significant elements of a traditional system since about 80% of the population live on agricultural communes and consume mainly the food they produce. Only a few goods are distributed through the market mechanism.

The following diagram gives mixes of different allocative solutions by countries. These mixes are approximate.

Diagram 1.4.5(1) Solutions to the Resource Allocation Problem by Country



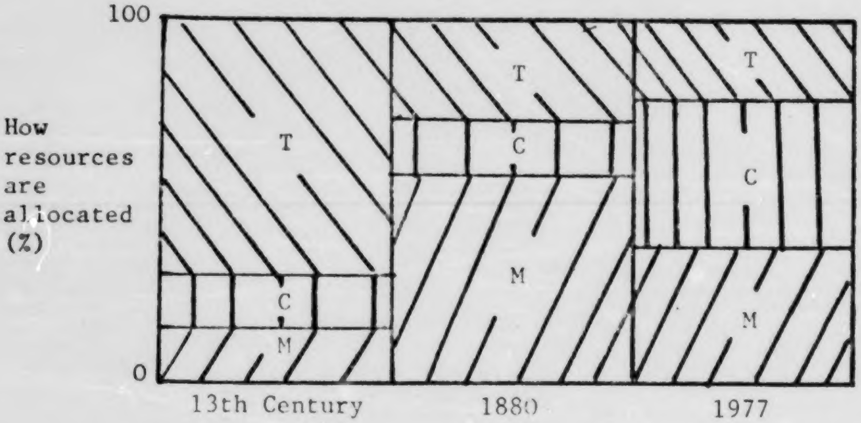
KEY: C = Command T = Traditional M = Market

1.4.6 The classification of a society does not remain fixed. It changes as the solutions to the what, how, and for whom, problems alter in response to developments in the overall economic and/or historical context within which the nation or society exists.

Example. In the 13th century Britain had a traditional type of economic system, as did most European countries. The Industrial Revolution of the 18th century enabled Britain to become the 'workshop of the world' and to emerge as the first and most advanced of the market economies. Since World War II in Britain a larger proportion of allocative decisions have been made though the command mode.

The following diagram shows how the solution to the economic problem in Britain has changed over time.

Diagram 1.4.6(1) The Changing Solution to the Resource Allocation Problem in Britain



Conversely, the past two decades have seen a greater market element appearing in the command economies of Russia, Czechoslovakia, Romania and other Eastern Bloc countries. By and large, the increasing use of markets has been related to the second of the economic problems: how to produce more efficiently.

MICRO UNIT 2

DEMAND

2.1 The Concept of Demand
2.2 Influences on Demand
2.3 Assumptions in the Theory of Demand
2.4 Implications of the Assumptions
2.5 Individual Demand
2.6 Market Demand
2.7 Characteristics of Demand

2.1 The Concept of Demand

2.1.1 Each nation has a finite amount of resources. Therefore there is an upper limit to the amount of goods and services which any nation can produce in a given time period.

However, there is an infinite number of different sets of goods and services which any nation could produce in that time period. To be economically efficient each nation must identify, from all the possible sets of goods and services it could produce, that particular set which would satisfy wants as fully as possible.

Example. One way to express society's wants would be to delegate that responsibility to a young child and let him decide which set of goods and services the economy should produce out of all feasible sets. Since society is a collection of diverse individuals with varied wants, the resulting allocation of resources in favor of the production of candy, milkshakes, cake, ice cream, TV cartoons and comic books would certainly leave most of society believing that resources had been allocated inefficiently. The problem is to find some method to determine the best allocation of resources.

2.1.2 Out of a given income, the amount which an individual is willing to allocate to a particular good is an expression of his want for that good.

Example. In allocating the weekly food budget the typical housewife buys those items which the household wants and does not allocate income to goods which no one in the household wants, i.e. she attempts to satisfy the household's wants as fully as possible given the budget constraint.

2.1.3 The amount of a given income actually spent on a particular good will depend upon the price of that good and its ability to satisfy wants compared to the price of other goods and their ability to satisfy wants.

Example. In allocating the weekly food budget the housewife implicitly uses marginal analysis in a constrained maximization problem (1.3). $10 allocated to steak would yield some utility to the household. $10 allocated to hamburger would also yield some utility. If only one of these two goods can be purchased because of budget constraint the housewife must evaluate whether $10 would yield more utility if spent on hamburger rather than on steak. Since the/

the price of each will determine what quantities of each could be purchased and consequently how fully wants can be satisfied, price will be a major determinant of how much of each good will be purchased.

2.1.4 A relationship exists between the price of a good and the quantity of that good which an individual would be willing to purchase. This relationship is known as individual demand. The corresponding relationship for the collection of individuals constituting a market is known as market demand.

Example. Each student has an individual demand for textbooks. All students, faculty, administrators, library and computer personnel on a confined campus (a market), have a market demand for textbooks.

2.1.5 The interaction of the demands of individuals for particular goods in attempting to satisfy their wants as fully as possible, and the supply (Unit 3) of goods by manufacturers attempting to gain as much profit as possible, is one of the principal ways in which resources are allocated in a market economy (1.4.2.3). Thus the analysis of demand is of critical importance in understanding how a market operates.

Example. The demand by U.S. citizens for small cars exhibited by the large number of people buying Volkswagens and Toyotas several years ago stimulated U.S. automobile manufacturers to start producing compacts. This involved massive retooling and significant resource reallocation on the part of the three major automobile producers: General Motors, Ford and Chrysler.

2.2 Influences on Individual Demand

2.2.1 A large number of factors influence the amount (including zero) of a particular good which an individual buys. The major factors are:

time period
personal characteristics
values of society
economic factors
expectations.

Example. How much of a specific wine an individual buys will depend upon the time period under consideration, the utility wine affords, which in turn could depend upon whether the individual grew up in a wine drinking household, the attitudes of the society within which the individual lives (e.g. Mormons do not drink wine whereas French children are served wine), the price of local Burgundy versus a French Chateau wine, income constraint, and expectations about future wine prices which will be influenced by the quantity and quality of this year's crop.

2.2.1.1 Time Period: Given an individual buys a specific good the longer the time period under consideration, the larger will be the quantity of that good which an individual will buy, assuming other factors which influence the amount bought do not change.

Example. A beer drinker will buy more beer in a month than in a week, and more in a year than in a month. The fact that he may buy no beer during the week he is in hospital for an appendectomy is not because of the time period under consideration but because his tastes and preferences or some other factors have changed.

2.2.1.2 Personal characteristics: While many people have similar tastes, few, if any, have identical tastes. Precisely how tastes and preferences are determined is unknown, but they are influenced by background and environment, by religion and belief, by temperature and humidity, and by many other factors which bear on the individual.

Example. A bachelor agnostic New Yorker has a different set of tastes and preferences from a devout Mohammedan of the same age living in an extended family on the edge of the desert in Saudi Arabia.

2.2.1.3 Values of society: Most societies have sumptuary laws which are laws prohibiting or limiting the purchase of, or more often the sale/

sale of, various goods and services. In addition, societies often exert moral pressure which can influence individuals. Members of society may break the law or ignore pressure and may suffer explicit (prison) or implicit (exclusion from group activities) penalties.

Example. Bulk purchase and sale of marijuana is illegal in the U.S. and the smoking of marijuana carries different penalties in different States. In certain States, although prostitution is not regarded as a criminal activity, prostitutes are often discriminated against.

2.2.1.4 Economic factors: The economic variables which influence the quantity of a particular good which an individual buys are:

the price of the good
the price of other available goods
the income (budget) of the individual

Example. How much "car" to buy will be influenced by the prices of cars of different sizes and characteristics, the prices of other goods related to running a car, such as gasoline and spare parts, the prices of other goods and services upon which a limited budget may be spent, such as a vacation, and the income available to be spent on all goods.

2.2.1.5 Expectations about the future: Information about possible future events can affect the amount of a particular good which an individual buys in a given time period.

Example. Consider the following newspaper report: "The news for coffee drinkers is not good. Heavy frost in Brazil has severely damaged coffee plants in many areas of the country and experts are predicting one of the poorest crops in several years. Some are predicting that coffee prices could double within a few months, others are even more pessimistic. The reports have sent housewives on a coffee buying spree and several stores have stated that their stocks of vacuum-packed tins of coffee are exhausted."

2.3 Assumptions in the Theory of Demand

2.3.1 A necessary condition for analysing the actions of individuals in buying goods and services is that they act in a manner which is consistent with achieving some objective. If this were not the case, i.e. if the purchases of goods and services by individuals were random, a logical analysis would not be possible.

The assumption made in the theory of demand is that individuals, in allocating incomes on goods and services, attempt to satisfy their wants as fully as possible, i.e. to maximize utility.

Example. Typically students do not allocate their incomes by coin tossing. In deciding whether to spend a dollar on a hamburger or a milkshake a student will compare hamburger and milkshake utilities and choose that good which yields the higher utility.

2.3.2 A number of further assumptions are made in constructing the theory of demand.

2.3.2.1 The individual knows the prices of goods and services in the market. Since the optimal amount of a given income to spend on a particular good will depend on the price of that good and its ability to satisfy wants compared to the prices of other goods and their ability to satisfy wants, a utility maximizing individual must know therefore the prices of all goods and services he might buy.

Example. Although a student may gain more utility from a T-bone steak than from a hamburger, his decision on which to buy will be affected by relative prices, as well as relative utilities.

2.3.2.2 Any unit of a good or service is identical in every respect to any other unit of that good or service, i.e. each good is homogeneous. If goods were not homogeneous, an additional unit of a good would be a new good; hence, more than one unit of the same good could not exist, and a theory of demand would not be possible.

Example. One can of Campbell's tomato soup is identical to any other can of Campbell's tomato soup. A can of Heinz tomato soup is a different good.

2.3.2.3 Each individual has a given income or budget to allocate among goods and services, i.e. he has a known income or budget constraint. To/

To maximize utility in spending a budget, it is necessary to know what quantities of each good and service can be purchased and therefore it is necessary to know what the budget constraint is.

Example. If a student were told that a rich uncle had died and left a legacy, the student would not be able to decide whether to stay on at college, buy a Ferrari, or celebrate with his friends until he found out how much the legacy amounted to.

2.3.2.4 Each individual's demand is considered with reference to a designated time period within which tastes do not change, and within which he must allocate all of his budget.

Example. The answer "three" to the question "How many cans of beer do you drink?", has no meaning without reference to some time period.

2.3.2.5 In order to isolate and measure the impact of changes in one variable on the quantity of a good which an individual wishes to buy, it is necessary to hold constant all other variables which also could affect purchases of that good. Holding constant all variables except one and measuring its impact is an analytical method used by economists. It is often known by its Latin name ceteris paribus (cet.par.) which translates to "with other things remaining equal".

Example. In order to isolate the effect which a change in the price of milkshakes has on individuals' spending on milkshakes, it is necessary to assume that income is constant, that tastes and preferences do not change, that the set of goods and services on which income can be spent is fixed, that the prices of other goods remain the same, and that they are not expected to change in the future. In other words, it is necessary to conceive of a world in which the only factor affecting his demand for milkshakes is a change in the price of milkshakes.

Example 2. In recent years the number of pocket calculators bought by students has increased significantly. Two principal reasons for increased purchases are:

1 the lower prices of calculators
2 the higher incomes of students

To isolate the impact on purchases of the lower prices it would be necessary to hold constant student incomes and other relevant factors affecting purchases of calculators. Similarly, to measure the impact of higher student incomes on calculator purchases/

purchases it would be necessary to hold other things constant, i.e. adopt the cet.par. assumption.

2.3.2.6 The individual is able to identify the satisfaction which he will gain from the consumption of different goods and different amounts of a given good. His satisfaction is expressed in terms of his own measure of utility. For simplicity's sake it is assumed that the individual measures satisfaction in terms of the number of his own "utils" which each unit of a good yields.

Note: In the real world neither can individuals' utilities be compared nor do individuals estimate the number of utils yielded by a good but their choices of goods reflect their own preferences, i.e. they behave as though they were able to assign utilities to different goods in maximizing utility. The precise numbers used in the measurement of utils are themselves unimportant. It is only important that whatever scale of measurement is used enables comparisons to be made of the relative amounts of satisfaction an individual derives from his consumption of different goods.

Example. Faced with the choices of spending an evening at the movies, the theater, a ball game or studying, a student should be able to rank order the choices in terms of the utility each would yield, e.g.

Ball game	:	*500 utils*	*or*	*50 utils*	*or*	*5 utils*
Theater	:	*300 utils*		*30 utils*		*3 utils*
Movies	:	*200 utils*		*20 utils*		*2 utils*
Studying	:	*-100 utils*		*-10 utils*		*-1 util*

2.3.2.7 As an individual consumes more of a good in a given time period total utility increases, but at a decreasing rate, i.e. the increase in utility from additional units of a good (marginal utility) falls. This is the principle of diminishing marginal utility.

Note: When total utility reaches a maximum, marginal utility becomes zero and additional units of the good would not increase total utility.

Example. A tennis player at the end of a five set match will obtain more utility from the first mouthful of water than from the second, more from the second than the third, and so on. At some stage, say by the sixth mouthful, he will be sated and will obtain no more utility from additional water. Additional water would not be consumed because it would not add to total utility, i.e. the marginal utility of a seventh or subsequent mouthful of water would be zero, and would be refused/

refused by the tennis player. Table 2.3.2.7(1) presents data illustrating the utility gained by a tennis player from drinking water.

Table 2.3.2.7(1) The Utility from Drinking Water

Number of Mouthfuls of water	Total Utility	Marginal Utility
0	0	
1	100	100
2	180	80
3	240	60
4	280	40
5	300	20
6	310	10
7	310	0
8	300	-10

2.3.2.8 Total utility can be calculated by summing the relevant marginal utilities.

Example. The total utility from 3 mouthfuls is 240 utils, made up from 100 from the first mouthful, 80 from the second, and 60 from the third.

2.3.2.9 Total utility can be represented diagramatically by plotting total utility against units of a good consumed. If it is assumed that the pattern which emerges between points would also emerge if smaller units were considered, then a consumer's curve can be drawn to exhibit the relationship between utility and units of a good consumed.

Example. Diagrams 2.3.2.9(1) and 2.3.2.9(2) exhibit the plotting of points and the continuous curve showing the relationships of Table 2.3.2.7(1).

Diagram 2.3.2.9(1)   The Utility from Drinking Water

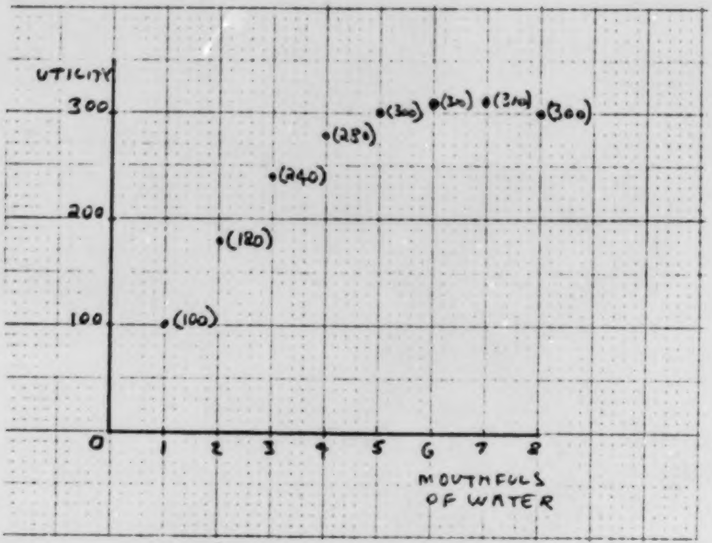
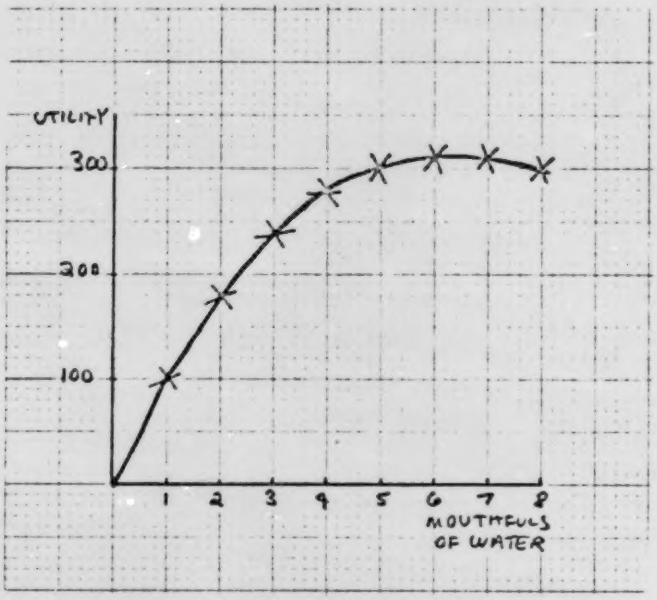


Diagram 2.3.2.9(2)   The Utility from Drinking Water



2.4 Implications of the Assumptions

2.4.1 The existence of diminishing marginal utility means that an individual could increase total utility by purchasing a combination of goods rather than by allocating all income to one good. Total utility could be increased by reallocating income from goods with low marginal utility to goods with higher marginal utility.

> *Example. In the cafeteria at lunchtime, students typically do not allocate their lunch budget on coffee alone. The reason is that total utility could be higher by spending the lunch budget on a variety of items, each with a high initial utility. For most people, the first helping of French fries at a price of 20c. would yield more utility than a sixth cup of coffee, the price of which was also 20c.*

2.4.2 Total utility will be maximized when any income reallocation does not increase total utility. This will occur when the last dollar spent on each good yields the same utility, i.e. when

$$\frac{\text{MU of good A}}{\text{Price of good A}} = \frac{\text{MU of good B}}{\text{Price of good B}} = \cdots\cdots = \frac{\text{MU of good Z}}{\text{Price of good Z}}$$

Thus the rule for efficient consumer behaviour, the maximization of utility, is that income must be allocated so that the ratios of marginal utilities to prices for all goods are equal.

> *Example. To explain the above rule in more detail, consider the table below which is constructed under the following assumptions:*
>
> *a) The individual is able to measure his own utility in terms of utils.*
>
> *b) The law of diminishing marginal utility operates.*
>
> *c) The price of the two goods illustrated, hamburgers and milkshakes, is $1 each. This price is assumed to be unaffected by the behaviour of any individual, i.e. buying or not buying a unit or units.*
>
> *d) The individual has an income of $10 which he allocates entirely to the two goods in a given time period.*
>
> *e) Hamburgers and milkshakes are the only goods on which he can spend his income.*
>
> *The table shows the total utility gained from consuming up to 10 hamburgers and 10 milkshakes, the marginal utility from each good at each level of consumption, and the total utility gained/*

gained by each possible combination of purchases.

Table 2.4.2(1) Possible Combinations of Hamburgers and Milkshakes from a $10 Income, and Corresponding Utilities

Number of Hamburgers	TU_H	MU_H	Number of Milkshakes	TU_M	MU_M	Total Utility $TU_M + TU_H$
0	0		10	104		104
		13			2	
1	13		9	102		115
		12			3	
2	25		8	99		124
		11			4	
3	36		7	95		131
		10			8	
4	46		6	87		133
		9			10	
5	55		5	77		132
		8			12	
6	63		4	65		128
		4			14	
7	67		3	51		118
		3			15	
8	70		2	36		106
		2			16	
9	72		1	20		92
		1			20	
10	73		0	0		73

Consider the following allocations of the $10 budget:

a) *The individual might decide to divide the $10 equally between the two goods, buying 5 hamburgers and 5 milkshakes, for a total utility of 132 utils, 55 utils from hamburgers and 77 utils from milkshakes. The 55 utils from hamburgers can be calculated by adding 13 utils from the first, 12 from the second, 11 from the third, 10 from the fourth, and 9 from the fifth hamburgers. Similarly, the 77 utils from milkshakes can be calculated by adding 20 utils for the first, 16 for the second, 15 for the third, 14 for the fourth and 12 utils for the fifth milkshake. Since he would derive 9 utils from the 5th hamburger and 12 utils from the 5th milkshake, allocating the budget in this way:*

$$\frac{MU_H}{P_H} < \frac{MU_M}{P_M} \; ; \text{ i.e. } \frac{MU_H}{P_H} = \frac{9}{1} \text{ and } \frac{MU_M}{P_M} = \frac{12}{1}$$

The individual would gain total utility by increasing his purchases of milkshakes and buying fewer hamburgers. By doing so, he would substitute a good with a higher marginal utility per dollar for a good with a lower marginal utility per dollar.

b) Suppose the individual then reallocates his budget and buys 4 hamburgers and 6 milkshakes instead of the previous combination of 5 hamburgers and 5 milkshakes. He would derive 10 extra utils from the additional milkshake, and sacrifice 9 utils by consuming one less hamburger. Thus his total utility increases from 132 to 133 utils.

With this combination of purchases

$$\frac{MU_H}{P_H} = \frac{10}{1} \quad \text{and} \quad \frac{MU_M}{P_M} = \frac{10}{1} \quad \text{so}$$

the ratios of marginal utilities to price in both cases are equal.

c) The individual, however, could not increase total utility by any further reallocation of his budget in favor of more milkshakes and fewer hamburgers. If he were to buy 3 hamburgers and 7 milkshakes, his total utility would fall by 2 since the extra milkshake would provide 8 additional utils while 10 utils would be given up by purchasing one less hamburger. By this budget allocation

$$\frac{MU_H}{P_H} > \frac{MU_M}{P_M} \quad \text{since} \quad \frac{MU_H}{P_H} = \frac{11}{1} \quad \text{and} \quad \frac{MU_M}{P_M} = \frac{8}{1} .$$

The combination of 4 hamburgers and 6 milkshakes yields the highest total utility because only with these quantities of the two goods will the rule for efficient consumer behaviour be satisfied, i.e.

$$\frac{MU_H}{P_H} = \frac{MU_M}{P_M} .$$

Example 2. Suppose an individual were allocating $10 on beer and peanuts per week, the price of beer being $1.00 per pitcher and the price of peanuts being 25c. per bag. To be in equilibrium the marginal utility of beer would have to be 4 times the marginal utility of peanuts. Suppose the ratio were:

MU/

$$\frac{MU_B}{P_B} = \frac{500}{100} \quad \text{and} \quad \frac{MU_P}{P_P} = \frac{150}{25}$$

$$\text{i.e.} \quad \frac{MU_B}{P_B} = \frac{\text{[illegible]}}{1} \quad \text{and} \quad \frac{MU_P}{P_P} = \frac{6}{1}$$

By reallocating income from beer to peanuts, total utility will rise since $\frac{MU_P}{P_P} > \frac{MU_B}{P_B}$ *, i.e. the gain in utility from consuming additional peanuts will more than offset the loss in utility from consuming less beer. However, as additional peanuts are consumed* MU_P *will decrease and as less beer is consumed* MU_B *will increase. Utility will be maximized when* $\frac{MU_B}{P_B} = \frac{MU_P}{P_B}$ *when, for example,* $\frac{5.25}{1} = \frac{5.25}{1}$ *or* $\frac{525}{100} = \frac{131.25}{25}$

Note: Because, in the real world, infinitesimally small portions of most goods cannot be purchased, a utility maximizing individual may have to settle for an "equilibrium" position where the ratios are not quite equal but where total utility is at a maximum given the indivisibility of the goods in question.

2.4.3 When the individual is purchasing that combination of goods and services which maximizes his total utility, i.e. where the MU/P ratios for all goods are equal, there is no incentive for him to change his combination of purchases. At this stage he is in equilibrium. Equilibrium is defined as that state where there is an absence of forces leading to change.

> *Example. In the example of 2.4.2, once the individual has found the combination of hamburgers and milkshakes which maximises his utility, i.e. 4 hamburgers and 6 milkshakes, he would reduce his total utility by changing his purchases. However, if his income were to change, or if the prices of the goods were to change, then he would no longer be maximizing his utility and hence would have an incentive to change his purchases, i.e. he would no longer be in equilibrium.*

2.4.4 The analysis developed provides a basis for investigating the behaviour of utility maximizing individuals in response to changes in prices, incomes or other variables.

2.4.4.1 Price Change

Assume that after an individual has reached the utility maximizing income allocation (equilibrium) the price of one good changes. The individual will no longer be able to continue his existing spending pattern and be in equilibrium.

Consider a decrease in the price of one good. The original quantities can still be purchased but this would leave some of the budget unspent. In addition, the price decrease results in the MU/P ratios no longer being equal. To re-establish equality of the ratios (utility maximization) a reallocation of the budget will have to occur.

Consider an increase in the price of one good. The original quantities can no longer be purchased with the existing budget. However, even if the individual were given sufficient additional income to enable him to purchase the initial quantities, he would not maximize utility by doing so because the ratios of MU/P's for all goods would no longer be equal.

Example. Assume that the price of milkshakes in 2.4.2 example has increased from $1 to $2. This price increase changes the combination of purchases which the individual can make. The new possible purchases are shown in Table 2.4.4.2(1), in which the total utility gained from each possible combination is also shown.

Table 2.4.4.1(1) Possible Combinations of Hamburgers and Milkshakes from an Income of $10 after an Increase in the Price of Milkshakes to $2

Hamburgers	TU_H	MU_H	Milkshakes	TU_M	MU_M	TU_{H+M}
0	0		5	77		77
		13			12	
1	13					
		12				
2	25		4	65		90
		11			14	
3	36					
		10				
4	46		3	51		97
		9			15	
5	55					
		8				
6	63		2	36		99
		4			16	
7	67					
		3				
8	70		1	20		90
		2			20	
9	72					
		1				
10	73		0	0		73

Even if the individual were given an income of $16, which would buy the original combination of 4 hamburgers and 6 milkshakes, the MU/P ratios would not be equal, i.e.

$$\frac{MU_H}{P_H} = \frac{10}{1},\ \frac{MU_M}{P_M} = \frac{10}{2} = \frac{5}{1}\text{; therefore } \frac{MU_H}{P_H} > \frac{MU_M}{P_M}.$$

The individual will reallocate his income until the MU/P ratios are once again equal. This will occur when 6 hamburgers and 2 milkshakes are purchased, i.e. the ratios are 8/1 and 16/2 respectively. In the example the individual now purchases less of the good whose price has increased and more of the good whose price has remained the same.

2.4.4.2 Income change

Assume that after an individual has reached equilibrium his income changes. The individual will no longer be in equilibrium and will have to adjust his purchases to maximize utility. Consider first an increase in income. The sets of possible purchases will increase and to maximize utility the individual must change his purchases until the MU/P ratios are again equal for all goods. Consider now a decrease in income. The sets of possible purchases will decrease, and to maximize utility the individual must change his purchases until the MU/P ratios are again equal.

Example. In the example of 2.4.2 assume that the income of the individual increases to $15, cet.par. This has the effect of changing the possible sets of purchases as shown in Table 2.4.4.2(1).

Table 2.4.4.2(1) Possible Combinations of Hamburgers and Milkshakes from an Income of $15

Hamburgers	TU_H	MU_H	Milkshakes	TU_M	MU_M	TU_{H+M}
5	55		10	104		159
		8			2	
6	63		9	102		165
		4			3	
7	67		8	99		166
		3			4	
8	70		7	95		165
		2			8	
9	72		6	87		159
		1			10	
10	73		5	77		147

It can be seen that when 7 hamburgers and 8 milkshakes are purchased the MU/P ratios are 4/1 in both cases, and the total utility is 166, i.e. at its maximum. The fact that the consumption of milkshakes increased by 2 and hamburgers increased by 3 was due to the pattern of marginal utilities. Note that the marginal utilities of both hamburgers and milkshakes declined due to the fact of diminishing marginal utility. Since the consumption of both goods increased, total utility must have risen. If, as in the Table 2.4.4.2(1), marginal utilities are both positive but declining, marginal utilities and total utility move in different directions.

Note: As income increases in the real world the purchase of all goods does not typically increase in proportion. The reason is that as marginal utilities fall as more of some goods are purchased, new goods are bought to maximize total utility. The purchase of some goods may actually decrease as income increases, e.g. cheap cuts of meat.

2.4.4.3 Changes in other variables

When any variable changes which causes the marginal utility of any good to change, the individual must alter his purchase pattern to maximize utility.

Example. In the example of 2.4.2 assume that the individual student tries out for the football team and that his appetite for hamburgers increases markedly. Table 2.4.4.3(1) shows the new pattern of marginal utilities for hamburgers together with the new amounts of total utility derived from spending his $10 in different ways.

Table 2.4.4.3(1) Possible Combinations of Hamburgers and Milkshakes from an Income of $10 with a New Set of Utilities for Hamburgers

Hamburgers	TU_H	MU_H	Milkshakes	TU_M	MU_M	TU_{H+M}
0	0		10	104		104
		50			2	
1	50		9	102		152
		45			3	
2	95		8	99		194
		40			4	
3	135		7	95		230
		35			8	
4	170		6	87		257
		30			10	
5	200		5	77		277
		20			12	
6	220		4	65		285
		15			14	
7	235		3	51		286
		10			15	
8	245		2	36		281
		5			16	
9	250		1	20		270
		3			20	
10	253		0	0		253

At the original combination of purchases of 4 hamburgers and 6 milkshakes he is no longer maximizing utility. However, increasing the purchase of hamburgers by one and reducing the purchase of milkshakes by one results in a maximum total utility of 286 and brings the MU/P ratios back into equality at 15/1.

2.5 Individual Demand

2.5.1 The quantity of a particular good which an individual purchases depends on a large number of factors.

Example. The amount of vacation which a family purchases depends upon the time period under consideration, the price of vacation A versus vacation B versus vacation C, the prices of other goods which could be bought instead of a vacation (a new automobile), the price of goods which are required on vacations (vacation clothes and airline tickets), family income, size and age distribution of family, state of health, weather, etc.

2.5.2 To isolate and measure the influence of any one factor on potential purchases of a particular good, it is necessary to hold constant all other factors affecting purchases of that good.

Example. Suppose that as university fees increase the number of students applying to universities decreases but as family incomes and grants increase the number of applications also increases. To measure the impact of the fee increase alone it would be necessary to hold constant family income and grants.

2.5.3 In the real world the factors which influence purchases of many goods are constantly changing. In constructing a theory of demand one variable is selected initially, all other factors are assumed to be constant, and the way in which changes in the selected variable would affect purchases of one good are investigated.

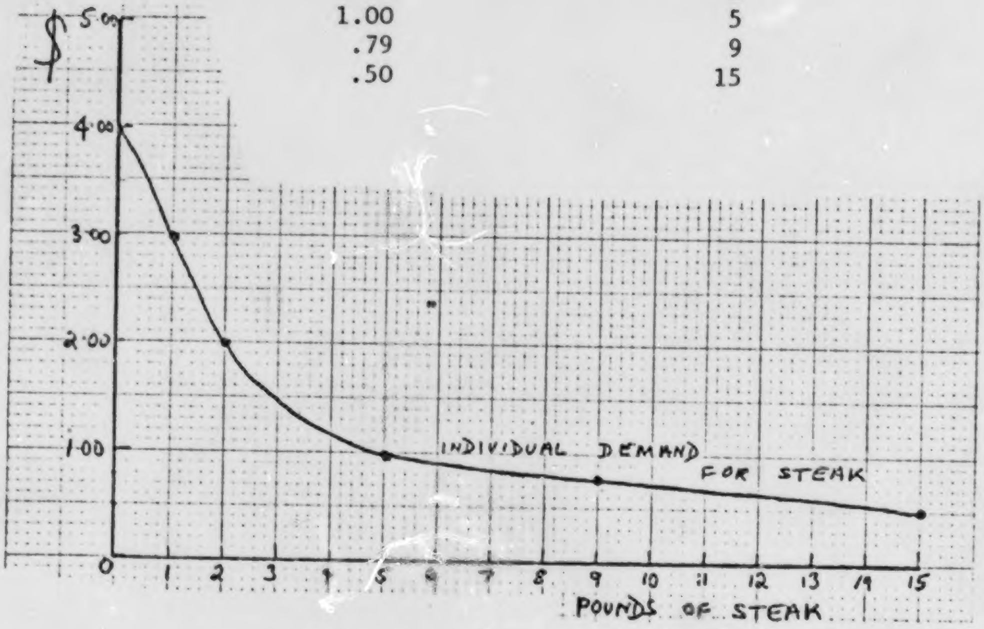
Example. In the 2.5.1 example, if the effect of family income only on vacation expenditure were being investigated, ideally families would be selected which were identical in every respect (e.g. tastes, size, age distribution, etc.) except income.

2.5.4 Because of the importance of prices in providing information to consumers and producers, in economics particular attention is concentrated on the relationship between the price and the amount of a good which an individual would be willing to buy in a given time period, all other factors held constant (cet.par.). This relationship is known as the individual demand for a good.

Example.

Diagram 2.5.4(1) Individual Demand for Steak in a Week

Price ($)	Quantity (pounds)
5.00	0
4.00	0
3.00	1
2.00	2
1.00	5
.79	9
.50	15



This demand curve shows that an individual is prepared to buy less steak at higher prices than at lower prices. specifically, if the price were $2 per pound, the individual would buy 2 pounds; if the price were 79c. per pound, the individual would buy 9 pounds. In this analysis all other factors affecting the amount of steak the individual would be willing to buy are held constant.

2.5.5 A demand curve does not describe an event, i.e. it does not tell what an individual bought. A demand curve is a schedule of intent. It is an hypothetical relationship concerning what an individual would be prepared to buy at each price in a given time period, cet.par.

Example. In moving along the demand curve in 2.5.4, one is comparing what an individual would buy if the the price of steak were $2 compared to what he would buy if the price were 79c. cet.par.

2.5.6 The typical demand curve is negatively inclined to the price axis; at higher prices lower quantities would be purchased and at lower prices higher quantities would be purchased. The reasons for the negative slope are:

1) at higher prices the individual is unable to buy as many units of a good, cet.par., because of the income constraint.

2) at higher prices individuals substitute relatively cheaper goods for the good in question.

Example. If the price of steak were $2 instead of 79c., the individual would not be able to afford to buy as much steak because of his budget constraint. Additionally, other goods such as hamburgers would become relatively more attractive.

2.5.7 The decrease in quantity of a good (good X) that would be purchased at a higher price is, therefore, a combination of two effects; an income effect and a substitution effect.

A higher price of good X will, cet.par., lower an individual's total utility because it decreases the quantities of goods he is able to purchase, i.e. he suffers a loss in real income. An equivalent loss in total utility could be caused by money income (budget) being reduced by a certain amount and prices of all goods, including X, remaining unchanged. Such a reduction in money income would lower the purchase of good X, i.e. the income effect leads to a reduction in the quantity of X purchased.

Alternatively, suppose that the individual's income went up simultaneously with the rise in the price of X. Suppose further that the individual was just as well off after the change as before. He would, of course, buy less X and buy more of other goods and services. The amount of the decrease in X purchased is entirely due to the substitution effect. Therefore, we can say that the substitution effect is the decrease in the quantity of good X purchased that would have resulted from the change in the price of X, with the prices of all other goods remaining the same, if the individual had been compensated for the change in his real income resulting from the change in the price of X.

Example. Consider an individual who chooses to work a 40 hour week at $5 per hour. He does not work any additional hours per week because he considers that each hour of leisure is worth at least $5, i.e. $5, the hourly wage rate, is what he gives up for every hour of leisure he enjoys. If the wage rate were to increase to $10 per hour, would he work more or less than 40 hours per week? The answer depends on the relative strengths of the income and substitution effects.

If he were to continue working 40 hours per week, his weekly income would increase from $200 to $400. At the higher income he will buy more of all goods, including leisure. If he "buys" more leisure it means that he will reduce the number of hours worked per week. Therefore, the income effect would lead to a reduction in hours worked. However, the price of leisure does not remain constant. The cost of an hour of leisure now rises to $10 per hour because that is what it costs the individual to "buy" an hour of leisure. At a higher price for leisure the individual will substitute relatively cheaper goods for leisure, i.e. buy less leisure. But buying less leisure is equivalent to working longer hours. Therefore, the substitution effect would lead to an increase in hours worked. Thus the income effect (buy more leisure) and the substitution effect (buy less leisure) move in opposite directions. It is not possible to know *a priori* *for any given individual which effect will predominate since it will depend upon an individual's preferences for leisure versus income. However, the effect on the average U.S. citizen over time is clear. Hours worked by the average individual in the U.S. have decreased over the past 100 years from over 60 hours to under 40 hours per week, i.e. the income effect has outweighed the substitution effect.*

2.5.8 The substitution effect is always negative, i.e. the increase in the price of a good will always lead to the substitution of relatively cheaper goods for that good. The income effect may be positive or negative. For "normal" goods the decrease (increase) in real income, (whether or nor caused by an increase (decrease) in the price of a good) will lead to a smaller (larger) quantity being purchased, i.e. the income effect is positive since changes in real income and quantity purchased are of the same sign. Thus for normal goods the positive income effect reinforces the negative substitution effect and the demand curves for such goods always slope downwards from left to right.

Example. Part of a family's food budget is allocated to chicken, meat and fish. When the price of chicken falls not only will more chicken be purchased because real income will have risen, but more chicken will also be purchased as it is substituted for the now relatively more expensive meat and fish, i.e. the income and substitution effects reinforce each other leading to more chicken being purchased at lower prices and exhibiting the normally sloped demand curve for chicken.

2.5.9 An "inferior good" is one whose quantity purchased falls when real income rises. An increase in real income may be caused by an increase in money income (budget) while the prices of goods remain constant/

constant, or by a decrease in the prices of goods, while income remains constant.

Example. As a family's money income rises and the prices of all goods remain the same, the family's real income will also rise. When this occurs, the purchases of cheap cuts of meat usually decline. Other examples of inferior goods are low cost housing since with higher incomes families switch to superior housing, margarine as families substitute butter, dried vegetables as families substitute fresh vegetables, etc.

2.5.10 For inferior goods the negative substitution effect of a price change generally exceeds the income effect, i.e. the change in the relative price of good X leads to a change in the quantity of good X purchased which is greater than the change in the quantity of good X purchased because of the change in real income caused by the price of X changing. The demand curve is normally sloped.

Example. Assume margarine is an inferior good. While a decrease in the price of margarine may lead to a family substituting margarine for butter, the resulting increase in real income may cause more butter and less margarine to be purchased. The substitution effect, i.e. margarine for butter, typically outweighs the income effect which for this good is negative, and which causes less margarine to be purchased because of rising real income. Thus the demand curve for margarine will be normally sloped even though it is an inferior good. A lower price of margarine will be accompanied by a larger quantity purchased, cet.par.

2.5.11 There is one famous example where the income effect exceeds the substitution effect and where over a range of prices and real income, a non-normal demand curve results. This type of good is known as a Giffen good; at higher prices a larger quantity is purchased, though the range of prices for which this condition holds is limited.

Example. In 19th century Ireland the bulk of family income was spent on potatoes, i.e. this was all the people could afford. However, when the potato crop was exceptionally large and the price of potatoes fell a lot, the Irish peasants experienced a significant rise in real income. The same number of potatoes could be bought for much less and with the money left over the Irish families could buy vegetables and meat. However, the purchase of other foodstuffs meant that fewer potatoes were required and thus their purchases could be reduced, i.e. at lower prices fewer potatoes were purchased. This was caused by the very large income effect. However, it is very difficult to imagine any family in the U.S. today for whom/

whom changes in the price of any one good could have such a dramatic effect on their real income.

2.5.12 The position of the demand curve can be changed by variations in forces which were being held constant. Any such change will alter the amount of a good an individual would be willing to purchase at each price.

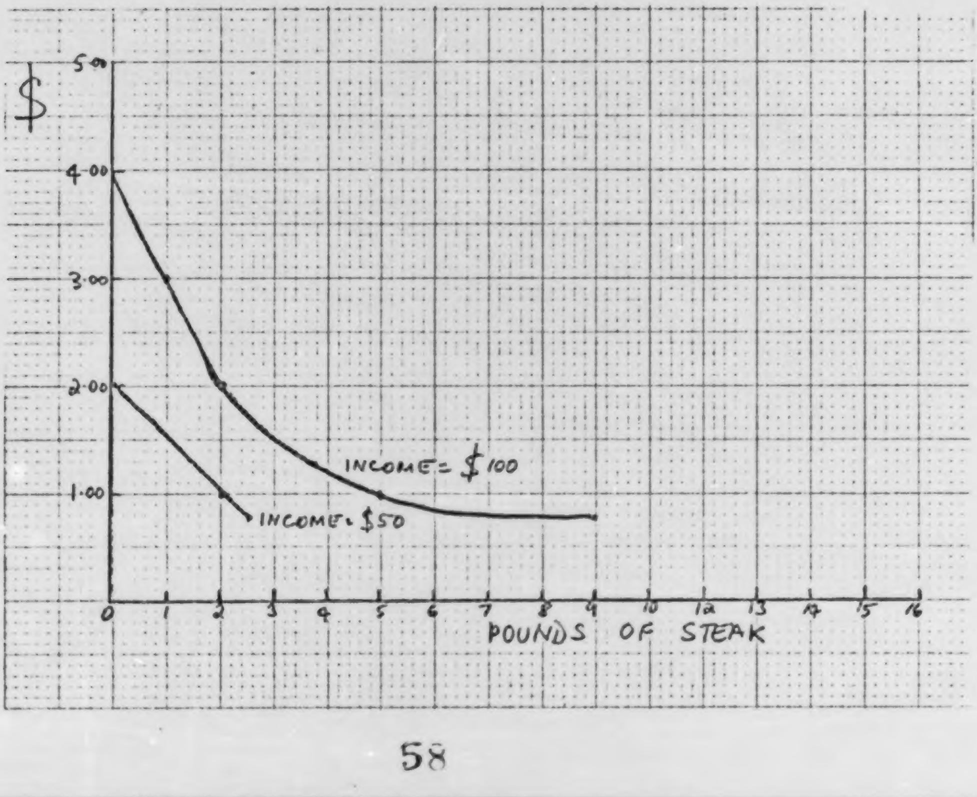
Example. A higher income would affect the amount of steak which the individual would be prepared to buy at each price. In the example of 2.5.4 a decrease in income would affect the amount of steak which an individual would be prepared to buy. Assume the following relationships:

Table 2.5.12(1)

Demand for Steak (Initial Income)			Demand for Steak (Lower Income)		
Price ($)	Quantity (pounds)	Weekly Income ($)	Price ($)	Quantity (pounds)	Weekly Income ($)
5.00	0	100	5.00	0	50
4.00	0	100	4.00	0	50
3.00	1	100	3.00	0	50
2.00	2	100	2.00	0	50
1.00	5	100	1.00	2	50
0.79	9	100	0.79	2.5	50

If income were $100 per week the individual would be willing to buy 9 pounds of steak. However, if income were only $50 per week he would be willing to buy only 2.5 pounds of steak. The following graph shows how the position of the demand curve is different for the two levels of income.

Diagram 2.5.12(1) Demand Curve for Different Levels of Income



Other factors could affect the position of the demand curve for steak, such as large number of guests expected (shift to right), good barbecuing weather (shift to right), illness in the family (shift to left), medical report relating heart disease to consumption of meat (shift to left).

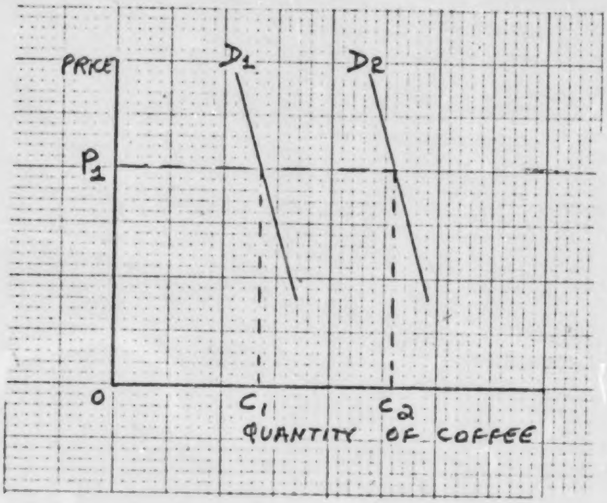
2.5.13 So far the analysis has been restricted to allocating a given budget or income among a number of goods and services in a given time period. The analysis of demand can be extended to take expectations into account, i.e. analyze behaviour when individuals expect prices and/or incomes to change in the future. Such expectations may affect expenditures during the current period and/or have the effect of causing individuals to shift their income between time periods; i.e. delaying spending now or bringing forward future spending to the present.

Example 1. An individual during the winter months may not allocate part of his budget to imported strawberries, partly because of their high price, but also partly because he knows the price of strawberries will be much lower during the summer. He thus postpones expenditure on strawberries, though he would be prepared to buy some strawberries all the year round if their prices were constant, even at the imported level, during the year.

(Similarly expectations about future income can affect current expenditure. For example, the ability of students to borrow money and maintain a level of consumption above their current earned income and the willingness of lenders to loan money to students are based on the expectations of both students and lenders that the students' future incomes will be sufficient to pay back the sums borrowed plus interest. The borrowing by students is consistent with utility maximization over a long time period, e.g. a lifetime.)

Example 2. In 1977, supermarkets in the U.S. reported substantial increases in sales of tinned coffee when it was announced in Brazil that sudden frosts had wiped out a significant portion of coffee plants. It was further announced that substantial price increases could be expected. Diagram 2.5.13(1) shows the effect of such price expectations.

Diagram 2.5.13(1) Shifting Demand caused by Expectations



Prior to the announcement from Brazil an individual was buying C_1 *pounds of coffee at a price of* P_1 *on demand curve* D_1*. Expectations of price increases shifted the demand curve to* D_2 *and the purchase of coffee to* C_2*.*

2.6 Market Demand

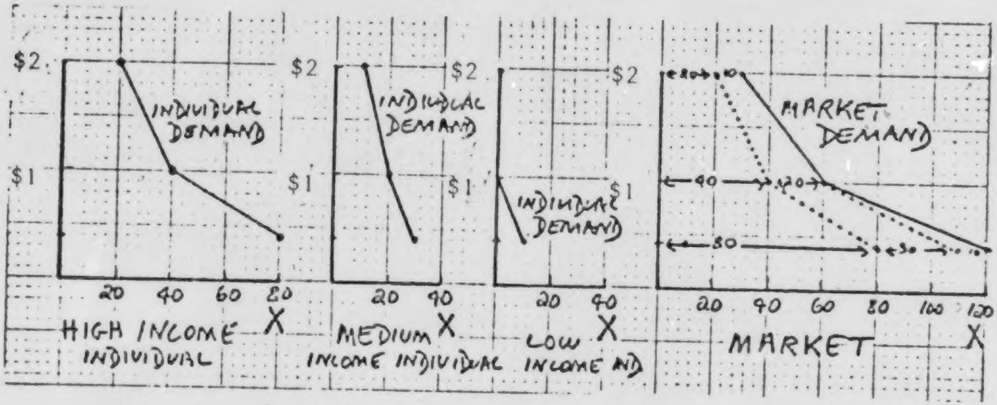
2.6.1 The aggregation of individual demands for a good at different prices in a given time period yields the market demand for that good in that time period. Market demand schedules and market demand curves are therefore constructed from individual demand schedules.

Example. Suppose that the following three individual demand curves exist for Good X in a given time period. Schedules 1, 2, and 2 describe the demands of a high income individual, an average income individual, and a low income individual respectively. Their sum yields the market demand, assuming no other individuals in the market.

Table 2.6.1(1) Individual and Market Demand for Good X

Price ($)	High Income	Medium Income	Low Income	Market Demand
2.00	20	10	0	30
1.00	40	70	0	60
.40	80	30	10	120

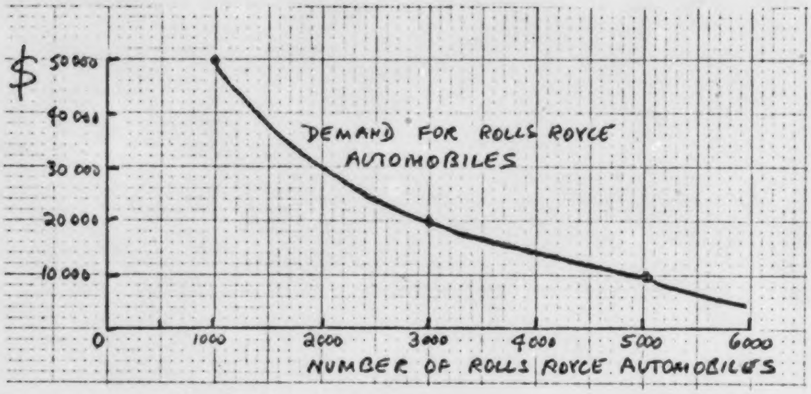
Diagram 2.6.1(1) Individual and Market Demand for Good X



2.6.2 A movement along a market demand curve indicates different quantities of the good that all consumers in that market would be willing to purchase at each price in a given time period, cet.par.

Example. Assume the diagram below shows the U.S. market demand for Rolls Royce automobiles.

Diagram 2.6.2(1) Market Demand for Rolls Royce Automobiles

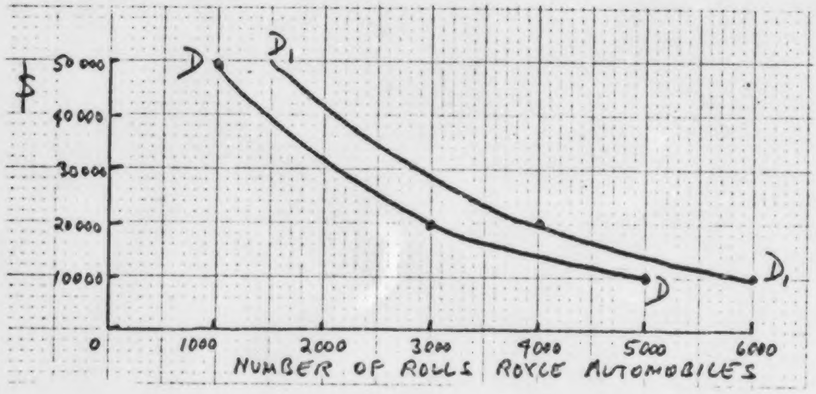


If the price of a Rolls Royce were $50,000, the quantity demanded would be 1,000 per annum. By contrast, people would wish to buy 3,000 Rolls Royces per annum if the price were only $20,000.

2.6.3 Changes in consumers' incomes, tastes, prices of other goods, price expectations or number of buyers will result in a shift in the position of the entire market demand curve. This means that at any given price consumers would buy a different quantity of the good, in comparison to the quantity demand before the relaxation of the cet.par. assumption.

Example 1. Suppose that those U.S. households which typically buy expensive cars experience a significant rise in income. The effect of this income change on the demand for Rolls Royce automobiles is shown by a shift in the position of the demand curve from DD to D_1D_1.

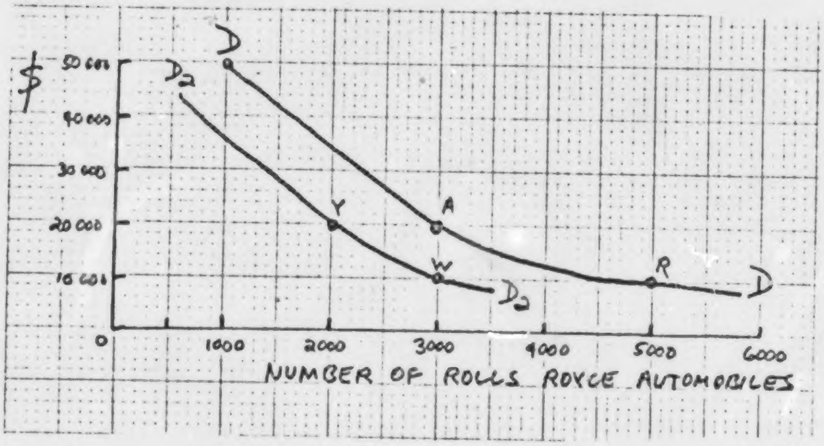
Diagram 2.6.3(1) Market Demands for Rolls Royce Automobiles with Different Income Levels



At the lower income level consumers would be prepared to buy 3,000 Rolls Royce automobiles per annum at a price of $20,000 (point A on demand curve DD). At the higher income level consumers would be prepared to buy 4,000 Rolls Royce automobiles per annum at the same price of $20,000 (point B on demand curve D_1D_1). Similarly, while 5,000 cars per annum would be demanded at a price of $10,000 (point R on demand curve DD), at the higher income level individuals would demand 6,000 cars per annum at the same price (point S on demand curve D_1D_1). The shift of the demand curve from DD to D_1D_1, reflecting the higher income level, is traced out by joining R, S and other points which denote the new quantities which consumers would be prepared to buy at each price.

Example 2. Suppose that a leading Japanese automobile manufacturer produced a new luxury automobile which rivals the Rolls Royce (and which has been named "Wolls Woyce"), but whose price is significantly lower than the price of Rolls Royces. Because some potential buyers of Rolls Royces would now be prepared to buy "Wolls Woyces", the effect would be to shift the demand curve for Rolls Royces from DD to D_2D_2, indicating that consumers would be prepared to buy fewer Rolls Royces at each price.

Diagram 2.6.3(2) Market Demands for Rolls Royce Automobiles with and without the Wolls Woyce



Instead of being willing to buy 3,000 Rolls Royces per month at a price of $20,000 (point A on demand curve DD), only 2,000 per month would be demanded by individuals at that price (point Y on the new demand curve D_2D_2) as a result of the introduction/

introduction of "Wolls Woyces" into the luxury car market. Similarly only 3,000 Rolls Royces per year would be demanded at a price of \$10,000 (point W on the new demand curve D_2D_2) compared to 5,000 per month (point R on demand curve DD) before the introduction of the Japanese car.

Points such as Y and W lie on the new demand curve D_2D_2 which shows the reduced quantities of Rolls Royce consumers would be prepared to buy at each price.

Example 3. If the Rolls Royce market within the United Kingdom is compared to the world market for Rolls Royces this would be represented by a shift to the right of the demand curve for Rolls Royces, as potential buyers from the United States, Canada, Saudi Arabia, etc., are added.

2.7 Characteristics of Demand

2.7.1 Typically demand curves slope downwards to the right, indicating that the lower the price of a good the larger will be the quantity of that good individuals will be prepared to buy. However, how much larger the quantity that individuals would buy, for a given price decrease, differs for different goods and also differs for a given good depending upon the point selected on a demand curve.

> *Example. After the relaxation of price controls on beef in the U.S. in the early '70s the price of beef rose sharply and this led to a significant decrease in beef purchases by U.S. households. Total expenditure on beef fell. In contrast, the large increase in gasoline prices in the same period led to a relatively small decrease in gasoline purchases. Total expenditure on gasoline rose.*

2.7.2 The demand for goods can be classified according to the responsiveness of quantity demanded to changes in any of the factors affecting demand. In considering the responsiveness of quantity demanded of a good to changes in the price of that good, all other factors held constant, the classifications are (i) price inelastic, (ii) price elastic, (iii) unitary price elasticity. These classifications imply whether total expenditure on the good would increase, decrease or remain constant as the price of the good changes, cet.par. Similar classifications exist for changes in other factors.

2.7.2.1 Price inelastic. A good is classified as price inelastic when, as price changes, the per cent (proportional) change in the quantity demanded is less than the per cent (proportional) change in price. When the demand for a good is price inelastic, a price increase will lead to an increase in expenditure on the good and a price decrease will lead to a decrease in expenditure on the good, i.e. when $\frac{\Delta Q}{Q} < \frac{\Delta P}{P}$ demand is price inelastic

or, $E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} < 1$ demand is price inelastic

(Note: E stands for elasticity, not expenditure)

Total expenditure on the good (P x Q) increases as P increases and decreases as P decreases:

$$PQ > (P - \Delta P)(Q + \Delta Q)$$

$$PQ < (P + \Delta P)(Q - \Delta Q)$$

To be mathematically correct, E is normally negative since price and quantity changes move in opposite directions. For convenience, however, it is customary to ignore the minus sign.

Note: In all elasticity discussion it is important to realize that 1) the assumptions under which demand curves were analyzed hold, e.g. given time period, and 2) the concept of elasticity has meaning only for small changes in price, i.e. limited portions of the demand curve can be considered when discussing elasticity.

Example. Consider the following data which refer to the quantity of gasoline demanded by the residents of a town at two different prices during a typical day.

Price ($)	*Quantity (gallons)*
1.00	*100*
1.10	*99*

In considering a price increase from $1.00 to $1.10, the quantity demanded decreases from 100 gallons to 99 gallons, i.e. the demand curve is normally sloped.

$$\frac{\Delta Q}{Q} = \frac{100 - 99}{100} = \frac{1}{100} \quad \text{and} \quad \frac{\Delta P}{P} = \frac{1.10 - 1.00}{1.00} = \frac{1}{10}$$

$$E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} = \frac{1}{100} \Big/ \frac{1}{10} = \frac{1}{10} < 1$$

i.e. the demand for gasoline over the price range $1.00 - $1.10 is price inelastic.

Simultaneously, a price increase from $1.00 to $1.10 will cause total expenditure on gasoline to increase from $100 ($1.00 x 100) to $108.09 ($1.10 x 99).

Consider a price decrease from $1.10 to $1.00.

$$\frac{\Delta Q}{Q} = \frac{100 - 99}{99} = \frac{1}{99} \quad \text{and} \quad \frac{\Delta P}{P} = \frac{1.10 - 1.00}{1.10} = \frac{1}{110}$$

$$E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} = \frac{1}{99} \Big/ \frac{1}{110} = \frac{1}{9} < 1$$

i.e. the demand curve for gasoline over the price range $1.00 - $1.10 is price inelastic. (The difference in the values of price elasticity $\frac{1}{10}$ *versus* $\frac{1}{9}$ *is caused by using different bases.)*

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In considering total expenditure on gasoline the price decrease will cause total expenditure on gasoline to decrease from $108.09 to $100.

If the owner of the gasoline station were free to set the price of gasoline, price elasticity of demand for gasoline could be an important determinant of the price he sets. The fact that the demand for oil in the world is price inelastic has led to the rapid increase in the revenues flowing to the oil exporting countries since the formation of OPEC and the raising of world oil prices.

2.7.2.2 Price elastic. A good is classified as price elastic when as price changes, the proportional change in the quantity demanded is greater than the proportional change in price. When the demand for a good is price elastic a price increase will lead to a decrease in expenditure on the good and a price decrease will lead to an increase in expenditure on the good.

i.e. when $\frac{\Delta Q}{Q} > \frac{\Delta P}{P}$ demand is price elastic, or $E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} > 1$

Total expenditure on the good (P x Q) decreases as P increases and increases as P decreases:

$$PQ < (P + \Delta P)(Q - \Delta Q)$$

$$PQ > (P - \Delta P)(Q + \Delta Q)$$

Example. The following data refer to the quantity of fried turkey demanded by students at Captain Flanders High School in a typical school day.

Price ($)	*Quantity (portions)*
1.00	*100*
1.10	*80*

In considering a price increase from $1.00 to $1.10, the price elasticity of demand of fried turkey is:

$$E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} = \frac{100 - 80}{100} \Big/ \frac{1.10 - 1.00}{100} = \frac{2}{10} \Big/ \frac{1}{10} = 2$$

Simultaneously with the price increase total expenditure decreases from $100 to $88.

In considering a price decrease from $1.10 to $1.00

$$E = \frac{\Delta Q}{Q} \Big/ \frac{\Delta P}{P} = \frac{2}{8} \Big/ \frac{1}{9} = 2.25$$

and total expenditure increases from $88 to $100 as price decreases.

2.7.2.3 Unitary price elasticity. A good is classified as being of unitary price elasticity when, as price changes, the proportional change in the quantity demanded equals the proportional change in price.

Simultaneously, total expenditure on the good remains constant for both price increases and decreases.

In calculating the proportional changes in price and quantity different numerical results will be obtained if the price and quantity before the change are used as a base compared to the price and quantity after the change (see examples 2.7.2.1 and 2.7.2.2).

> *Example. If the price of a pitcher of beer rises from 75c. to $1.00, we consider that to be a 33% increase whereas if the price of a pitcher of beer were to fall from $1.00 to 75c., we would consider that to be a 25% decrease. Thus the calculation of elasticity using the formula would depend upon whether a price decrease or increase were being considered. When demand is highly price elastic or highly price inelastic, and small changes only are being considered, the exact value of elasticity will not change significantly. However, if the price elasticity of demand is approximately unitary considering a price increase or decrease could yield values slightly less than 1 or slightly greater than 1.*

2.7.2.4 One way of resolving the problem of which price and quantity to use in calculating elasticity is to use the average of both prices and the average of both quantities. In calculating the change in price, for example,

$$\frac{\Delta P}{P} \text{ would become } \frac{\Delta P}{(P_1 + P_2)/2} = \frac{P_1 - P_2}{(P_1 + P_2)/2}$$

Similarly

$$\frac{\Delta Q}{Q} \text{ would become } \frac{\Delta Q}{(Q_1 + Q_2)/2} = \frac{Q_1 - Q_2}{(Q_1 + Q_2)/2}$$

and price elasticity of demand

$$E = \frac{\Delta Q}{Q} \Bigg/ \frac{\Delta P}{P}$$ would become

$$"E" = \frac{\frac{Q_1 - Q_2}{(Q_1 + Q_2)/2}}{\frac{P_1 - P_2}{(P_1 + P_2)/2}}$$

Example. In the 2.7.2.3 example the change in the price of the pitcher of beer is approximately 29% whether we are considering a price increase or decrease.

That is, $$\frac{\Delta P}{(P_1 + P_2)/2} = \frac{P_1 - P_2}{(P_1 + P_2)/2} = \frac{1.00 - 0.75}{1.75/2} = \frac{.25}{.825} = 29\%$$

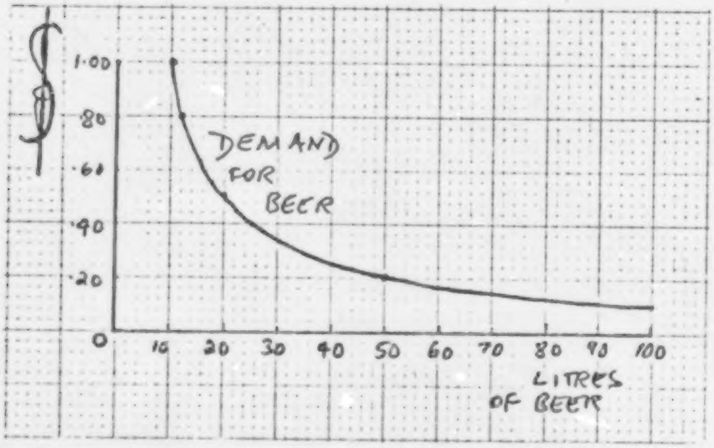
2.7.2.5 By using such a formula it can be shown that if a demand curve is of unitary price elasticity, total expenditure on the good remains constant (2.7.2.3) for both price increases and price decreases.

Example. Consider the following demand schedule and curve for beer.

Table 2.7.2.5(1) Demand and Expenditure Schedules for Beer

Price ($)	Quantity (Pitchers)	Total Expenditure ($)
1.00	10	10.00
.80	12.5	10.00
.50	20.0	10.00
.40	25.0	10.00
.20	50.0	10.00
.10	100.0	10.00

Diagram 2.7.2.5(1) Demand Curve for Beer



In considering a price decrease from \$1.00 to \$0.80 the increase in the quantity demanded is 2.5 pitchers (12.5 - 10).

Using the formula, price elasticity of demand

$$\text{"E"} = \dfrac{\dfrac{10 - 12.5}{(10 + 12.5)/2}}{\dfrac{1.00 - 0.80}{(1.00 + 0.80)/2}}$$

$$= \frac{2.5}{22.5} \Big/ \frac{.2}{1.8}$$ *(ignoring the negative sign, 2.7.2.1)*

$$= \frac{1}{9} \Big/ \frac{1}{9}$$

$$= 1$$

Similarly in considering a price increase from \$1.10 to \$0.20 the decrease in the quantity demanded is 50 pitchers (100 - 50).

$$\text{"E"} = \dfrac{\dfrac{100 - 50}{(100 + 50)/2}}{\dfrac{0.20 - 0.10}{(0.20 + 0.10)/2}}$$

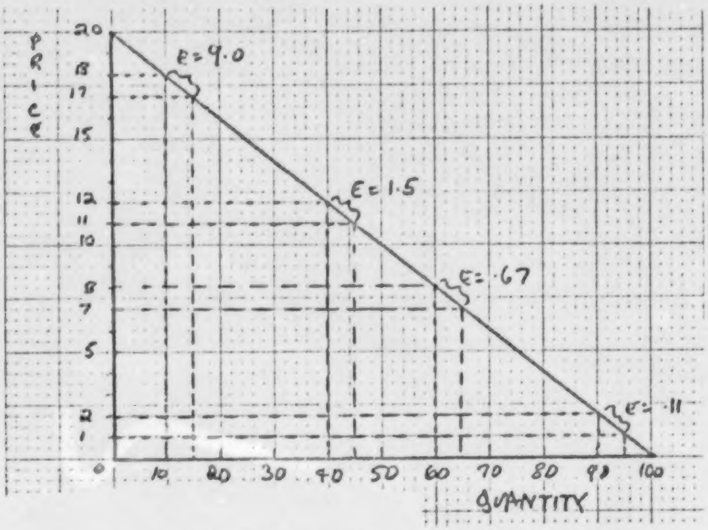
$$= \frac{50}{150} \Big/ \frac{0.1}{0.3}$$

$$= 1$$

2.7.3 Statements about a demand curve being elastic or inelastic refer to limited parts of a demand curve. Price elasticity of demand is not constant throughout the length of a straight line demand curve. At the top of the curve, price elasticity of demand is high (approaching infinity as the curve approaches the price axis), decreases down the length of the curve, passes through unity, and at the lower end of the curve becomes very low (approaching zero as the curve approaches the quantity axis).

Example. The following straight line demand curve shows that when price is 20c. nothing would be purchased and at zero price 100 units would be purchased.

Diagram 2.7.3(1) Elasticity along a Linear Demand Curve



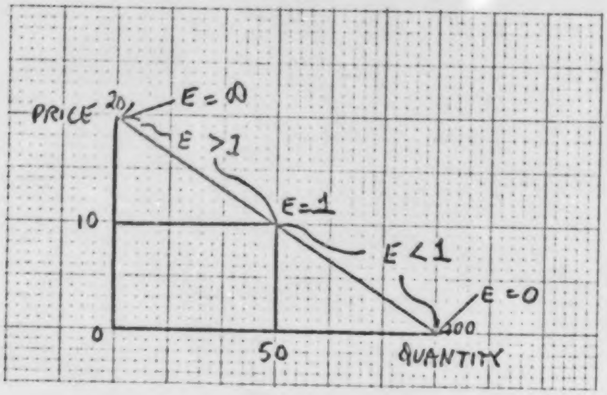
The following table containing calculations of price elasticity of demand shows that the value of E decreases as one moves along a linear demand curve from left to right.

Table 2.7.3(1) Elasticities along a Linear Demand Curve

P	ΔP	ΔP/P	Q	ΔQ	ΔQ/Q	$E = \frac{\Delta Q}{Q} \quad \frac{\Delta P}{P}$
18 17	1	1/18	10 15	5	1/2	9
12 11	1	1/12	40 45	5	1/8	1.5
8 7	1	1/8	60 65	5	1/12	.67
2 1	1	1/2	90 95	5	1/18	.11

It is clear that at some point on the demand curve the elasticity of demand is equal ot one. This occurs in the example at p = 10, Q = 50. On a linear demand curve that touches both axes the point of unitary price elasticity of demand is always the mid point of that line. Over the range of the demand curve to the left of the midpoint, E > 1, and approaches ∞ (infinity) as quantity approaches zero. Over the range of the demand curve to the right of the midpoint, E < 1 and approaches zero as P approaches zero. The following diagram shows these points.

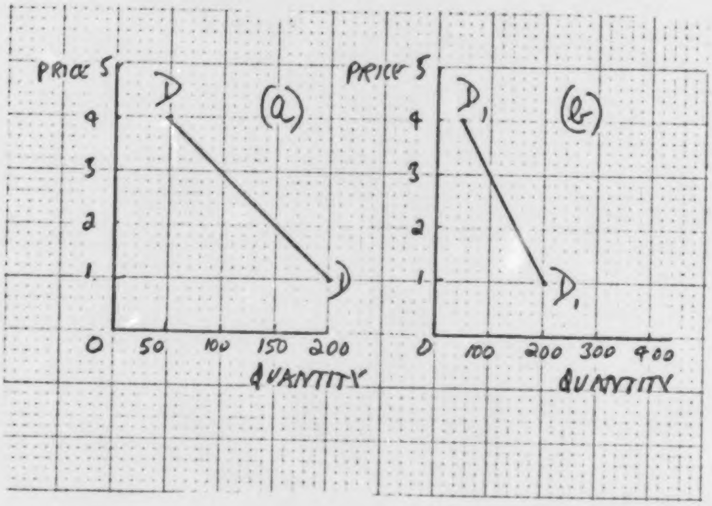
Diagram 2.7.3(2) Linear Demand Curve



2.7.4 It is misleading to judge the price elasticity of demand for a good by looking purely at the steepness of its demand curve. Everything depends on the scales used on the axes.

Example.

Diagram 2.7.4(1)



In the diagrams above, demand curve D_1D_1 is steeper than demand curve DD, but it would be wrong to infer that D_1D_1 was a more inelastic demand curve than DD. In fact, curves DD and D_1D_1 are identical demand curves. Since the steepness of the curves will depend on the units denoted on the axes, and since quantities are measured at 100 unit intervals in Diagram B compared to 50 unit intervals in Diagram A, it follows that D_1D_1 will be steeper than DD. But in both cases exactly the same quantities would be demanded at each price.

2.7.5 Other demand elasticities exist besides price elasticity of demand. A change in the price of one good can affect the quantity of another good demanded. The measure of this responsiveness is known as cross elasticity of demand and it is measured as

$$\frac{\Delta Q_A}{Q_A} \Big/ \frac{\Delta P_B}{P_B}$$

This ratio can vary from plus to minus infinity. Complementary goods have a negative cross elasticity, i.e. an increase in the price of one good will lead to a reduction in the quantity demanded of the complement. Substitute goods have a positive cross elasticity, i.e. an increase in the price of one good leads to an increase in the quantity demanded of the substitute. If the demands for goods are independent of each other the cross elasticity will be zero.

Example. Suppose that the price of butter increased by 10% and it was observed that the demand for bread decreased by 20%. The elasticity is -20/10 = -2, i.e. bread and butter are complements.

2.7.6 As income changes the amount of a good, cet.par., which is demanded may also change. The measure of the responsiveness of quantity of a good demanded to changes in income is:

$$\frac{\Delta Q}{Q} \Big/ \frac{\Delta \text{Income}}{\text{Income}}$$

There are five important values for income elasticity:

Negative - the quantity of the good demanded decreases as income increases

Zero - the quantity of the good demanded does not change as income increases

Between Zero and One - the quantity of the good demanded increases by a smaller proportion than the increase in income

Unitary - the quantity of the good demanded increases in proportion to the increase in income

Greater than One - the quantity of the good demanded increases by a greater proportion than the increase in income

Example. It has been observed that as incomes rise the expenditure on housing tends to rise by a greater proportion, i.e. the income elasticity of demand for housing is greater than one. This means that as people earn higher incomes they tend to spend larger proportions on housing. Goods with negative income elasticity are known as inferior goods, e.g. cheap cuts of meat.

MICRO UNIT 3

SUPPLY

3.1 The Concept of Supply
3.2 Identification of Variables
3.3 Assumptions in the Theory of Supply
3.4 Implications of the Assumptions
3.5 Firm Supply in the Short Run
3.7 Firm Supply in the Long Run
3.8 Industry Supply in the Long Run
3.9 Characeristics of Supply

3. Supply

3.1 The Concept of Supply

3.1.1 In a given time period, because of resource constraints, there is an upper limit to the quantity of goods and services which a society can produce. Within this limit, however, there is an infinite number of sets (different bundles) of goods and services which could be produced.

Example. The U.S. economy has the resources to produce over 50% more output than the USSR economy. A comparison of the two countries shows that proportionately the U.S. allocates more resources to the production of consumer goods and fewer to the production of defense goods than the USSR.

3.1.2 For society to produce the maximum possible amount of goods and services two conditions must be fulfilled. First, for each good produced the minimum amount of resources must be used, i.e. each good must be produced in an engineering efficient manner (1.2). Second, no available resource can be unemployed.

Example. In his famous 'guns and butter' speech of 1965 President Johnson stated that the U.S. economy could substantially increase the production of war materials and the production of consumer goods simultaneously because there were unemployed resources in the economy. In the early '70s, when resource cuts in many universities produced no noticeable decrease in the 'output' of students and/or research, many people argued that this was proof of engineering inefficiency within institutions of higher education.

3.1.3 The fact that all resources are employed in an engineering efficient manner does not guarantee economic efficiency. Economic efficiency also requires that the set of goods and services produced in an engineering efficient manner be that set which maximizes the utility of society (1.2).

Example. A manpower training program in the U.S. may be utilizing the minimum amount of resources required to produce, say, engineers, but this would constitute an inefficient use of resources if additional engineers were not required and hospitals were in need of additional trained nurses.

3.1.4/

3.1.4 When an economy is operating in an economically efficient fashion no redeployment of its resources can increase this society's utility. The only way in which the society can become better off is when additional goods and services become available. This necessitates more resources becoming available and/or better methods of production occurring. In the absence of additional resources or technological change, an increase in the output of one good must result in a decrease in the output of some other good.

Example. A farmer with 200 acres of farmland who is maximizing the amount of wheat which he can produce with his available resources will be able to increase his wheat output only if more resources (i.e. more land) become available to him and/or if superior production methods are discovered. If, on his 200 acres, he decides to produce some corn and there is no change in resources or technology, his output of wheat must fall.

Note: this assumes that extraneous factors which might influence wheat output, e.g. sun, wind, rain, locusts, birds, etc. are unchanged.

3.1.5 This unit analyzes the conditions under which goods and services are produced by firms. Firms are entities (or institutions) which employ resources (factors of production) and by combining the services of these resources produce goods and services.

Example. General Motors is one of the largest firms in the world and employs many resources (land, labor and capital) to produce a large range of automobiles.

A wine waiter produces a service by transferring wine from the cellar to your table and into the appropriate wine glass.

3.1.6 The decisions which society makes concerning how to produce goods and services are implemented in firms. Firms may operate according to conventions, i.e. in a traditional manner; under direction from the state, i.e. in a planned manner; or in response to prices, i.e. under market forces (1.4).

Example. In India many firms exist in the form of small-holdings which are farmed by traditional methods. In Russia firms are provided with directives and quotas which they are expected to meet. In the U.S. firms act in response to prices which they must pay for factors of production and which they obtain for their output.

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3.1.7 In market economies, all firms, whether they are state-owned, under state regulation, or are free to do whatever they wish, subject to legal considerations, must enter the markets for resource services. They must also pay attention to wants, usually expressed by the prices people are prepared to pay for their product.

Example. In the U.S. medical services are to a large extent determined by the willingness of the medical profession to supply services at the prices which individuals are willing to pay. In the U.K. most decisions on how much is to be spent on the provision of medical services are made by the government. Medical services are freely available to the population. However, it is still necessary for the U.K. Health Service to buy medical staff in competition with other firms, and although the product is free, i.e. is sold at a zero price, it is necessary for the government to attempt to determine what the needs of the population are in terms of medical care. In the U.S. markets exist for most medical services though some medical services are provided free to the very poor.

3.1.8 In a market economy a relationship exists between different prices of a good and the corresponding quantities which a firm would be willing to produce, cet.par. This relationship is known as firm supply. The corresponding relationships for the collection of firms constituting a market is market supply, and for all firms constituting an industry, industry supply.

Example. At given prices a farmer decides how much land and other resources to allocate to the production of wheat and all other crops. If the price of wheat were to increase and the price of other crops remain unchanged, it would pay the farmer to increase the acres under wheat. This would be true for all farmers. The effect of an increase in the price of wheat would be to increase resources devoted to the growing of wheat and hence increase the total amount of wheat produced.

3.1.9 The supply of all goods and services in the economy will be limited by resources (factors of production) available in the economy. The following classification is adopted by economists in discussing these factors:

Labor (human resources or human capital)

Capital (man-made resources)

Land (natural resources)

Entrepreneurship

Sometimes labor and entrepreneurship are treated together as "human capital", and capital and land are classified together as "non-human capital".

A feature of developed societies is the growth in quantity and quality of resources over time.

Example. Striking changes in the U.S. in the past 100 years have occurred not only in the range of goods and services produced, but in the way in which they are produced, and the resources available for their production. The vast concentration of resources which currently exists in the automobile industry in Detroit was unknown in 1877, railroads were operated with steam engines, the roads were very poor, farms were just beginning to mechanize and the size of the labor force was small compared to today.

3.1.9.1 Labor: The number of people in the population able and willing to work at going wage rates and working conditions is an economy's labor force. This labor force provides a flow of services which, in cooperation with other factors, produces goods and services. (The determinants of the demand and supply of labor, and other factors of production, are discussed in Unit 6.)

Example. In the past 50 years the population of the U.S. has approximately doubled. Out of a total population of over 210 million persons 43% are in the civilian labor force (93% of whom are employed and 7% of whom are unemployed at this time); 27% are not in the labor force (the bulk of whom are housewives; other groups include the old, retired, sick, and college students). The remaining 30% is composed of persons under the age of 16 and individuals in institutions (e.g. prisons) and in the armed forces.

As the number of people in the labor force has grown the composition has changed. Compared to 50 years ago, fewer older and younger people (earlier retiral and more schooling) and many more women are in the labor force. At the same time the education and skill level has increased. In terms of occupational classification over time the proportion of people working in agriculture and in the manufacturing sector has decreased and the proportion working in services has increased.

3.1.9.2 Capital: This is the stock of non-human resources created in past time periods which is currently available to society. This stock provides a flow of services which in cooperation with other factors of production produces goods and services for society's current consumption, and also new capital for future production.

Example. The quantity of capital in the U.S. has grown over time, but of even greater importance in terms of its contribution to the output of goods and services is the improvement in quality of that capital over time.

For example, to provide education services universities and colleges require a capital stock. This includes lecture theaters, seminar rooms, student dormitories, a computer centre, physics laboratories, roads, sewer pipes, lights, heating units, blackboards, projectors, computers, books, sports pavilions, running tracks and football fields. Over time the number of universities and colleges has increased substantially in the U.S. and much of the quality of the capital stock within them has increased in quality, for example the widespread adoption of calculating machines and the computer.

3.1.9.3 Land: This is the stock of all natural resources including agricultural land. The flow of services from the land, combined with others factors of production, produces goods and services.

Example. Recent disputes have occurred in many countries concerning the 200 mile fishing limit. Countries with coast lines are typically claiming that they own the ocean and its contents up to 200 miles from shore, i.e. it is their resource in the form of "land". This resource, in combination with other factors of production such as boats, fishing nets, and retail shops, produces goods called fish. (Much concern has been expressed by environmentalists about the rate at which sperm whales have been caught in the past and many stocks of this natural resource have been so depleted that they are in danger of extinction.)

3.1.9.4 Entrepreneurship: The existence of stocks of labor, capital and land does not guarantee that they will be put to economically viable use. It is necessary for individuals to identify potential uses for resources, to commit their own personal resources to the organization of other resources, and carry the risk of making a success out of different forms of economic activity. In market economies such activities are carried out by entrepreneurs. In centrally planned economies a group (or groups) of individuals (planners) decide how resources are to be deployed.

Example. U.S. history has many examples of successful entrepreneurs. In the automobile industry Ford and Sloan (General Motors) were entrepreneurs who hired factors of production and produced automobiles which were the cheapest in the world. Today General Motors is one of the largest firms in the world and the value of its output exceeds the value of the total output of many countries in the world. In the USSR automobiles/

automobiles are produced under central planning and individual entrepreneurship to establish new automobile companies in the USSR is not permitted.

3.1.10 The theory of supply is based on the operation of firms in a market economy, and the development of the theory parallels that of demand (Unit 2). The analysis of supply provides the other side of the demand/supply relationship outlined in 2.1.5

3.2 Identification of Variables

3.2.1 Many factors influence the quantity of a good which a firm supplies. The most important of these are:

Time period

Values of society

Economic factors

Expectations

Example. The amount of bourbon which a manufacturer produces depends on the length of time considered, the laws which regulate the production of spirits, the willingness of people to work under the conditions which prevail in his distillery, the prices which he will have to pay for the factors of production and the price for which bourbon can be sold, and expected future prices, which in turn could be affected by the grain crop.

3.2.2 Time period: the time period within which production takes place must be specified. Within a given time period the manufacturer must decide, in the light of the other factors, how much output to produce, which factors to hire, how much of each to hire, and how to best combine the different factors.

Example. It is not informative to state that a manufacturer of bourbon produces 100,000 bottles, without specifying whether this amount is produced in a day, a week, a month or a year.

3.2.3 Values of society: laws exist which prohibit the production of certain goods and services and/or regulate the conditions under which certain goods and services are produced.

Example. It is illegal to distil whisky (or produce nuclear bombs) in your home. Also, in many manufacturing industries children below a certain age can not legally be employed even if they are willing and are capable of doing the job.

3.2.4 Economic factors: the economic variables which affect the quantity of a good or service which a firm supplies are:

The price of the good or service

The prices of factors of production required to produce that good or service.

The productivity of the factors, i.e. the outputs from different combinations of factors of production.

Together these will determine the profitability of producing a good, which can be compared to the profitability of producing alternative goods. Firms require the information in making decisions concerning which goods to produce and which factors to hire.

> *Example. A shipowner visiting Japanese shipbuilding firms states he is prepared to pay $50m for a 500,000 ton tanker. Each Japanese shipbuilder, in deciding whether to submit an offer to build such a tanker must consider the price of $50m and the costs of the factors required to produce the tanker. Both of these will determine the profitability of the activity; moreover, they must assess the alternatives to tanker building, e.g. building bulk cargo vessels.*

3.2.5 Expectations: information about possible future events can influence the amount which a firm produces in a given time period.

> *Example. A firm may obtain confidential information that the price of its product and the price of the factors of production which it employs are expected to double next year. As a result the firm may decide to employ as many factors as possible and increase its current output and hold stocks until the price changes occur.*

3.3 Assumptions in the Theory of Supply

3.3.1 A necessary condition for analyzing the actions of firms in supplying goods and services is that they act in a manner which is consistent with achieving some objective. If this were not the case, i.e. if firms produced goods and services in a random manner, a logical analysis would be impossible.

The assumption made in the theory of supply is that the goal of the firm is profit maximization. Profits are maximized when the difference between the costs of producing goods and services and the revenues obtained from the sale of goods and services is as large as possible.

Example. In the 1960s the major U.S. automobile manufacturers started to produce compact automobiles when they saw the large and growing import of small foreign automobiles, i.e. the manufacturers responded to the growing demand for small automobiles and reallocated some resources away from large automobiles in the pursuit of the profit maximizing goal.

3.3.2 For pedagogical purposes it will be assumed initially that only two factors of production exist: labor and capital, and that each unit of labor is identical to every other unit of labor and that each unit of capital is identical to every other unit of capital.

Example. The typical bank in a town in the U.S. hires a manager, assistant manager, clerks, typists, security guards, computer operators and cleaners. Because of the specialized nature of the tasks each individual performs in the bank each is considered as a different type of labor by the bank. For the purposes of developing the theory of supply it will be assumed that each bank hires only one type of labor, i.e. that the bank, or any other firm, resembles the farmer hiring migrant workers on a first-come, first-hired basis. In other words the farmer hires the number of migrant workers he needs but does not distinguish one worker from another since all are considered to be identical. The same assumption applies to the use of capital.

3.3.3 In the real world a firm is classified according to ownership of capital employed in the firm. For the purposes of economic analysis the firm can be viewed as the location where resources are combined to produce goods and services under the goal of profit maximization. The ownership of resources, while important to the theory of income distribution (Unit 6) is not relevant to the theory of supply.

Example. The local supermarket may be a cooperative in which many individuals have joint ownership of the supermarket in the sense that they are responsible for the loan on the building and have put up money for inventories of all goods on sale. In contrast, the supermarket in a neighboring town may be owned by one individual or by a collection of individuals who own a chain of supermarkets. For the purposes of studying how goods and services are supplied by supermarkets the ownership of the supermarket is irrelevant.

3.3.4 The firm is a price taker in both the market for goods and services and the market for the factors of production. The actions of any one firm can not affect significantly the price of the good which it produces and the hiring or non-hiring of any factor of production by a firm will not affect significantly the price of that factor, i.e. a firm can sell all it can produce at the going price and can hire as many units of each factor of production as it wishes at the going price.

Example. In a large shopping precinct it is not possible for one baker to charge more for bread than other bakers because of the ease with which alternative sources can be found by shoppers. A baker would not charge less for his bread than the going price because he knows he can sell all the bread at that price. Similarly, if the baker were to decide to hire additional shop assistants he could do so without paying more for each additional assistant than he or any other baker pays currently for existing employees.

3.3.5 While most firms in the real world produce a variety of goods and services it will be assumed that each firm produces only one good and that each unit of that good is indistinguishable from any other unit of that good, i.e. the good is homogeneous.

Example. Campbells produce a range of soups, and variations exist even within a particular soup. For example, not every can of Scotch Broth contains exactly the same number of peas. In studying the supply of a type of soup the analysis is simplified if each can is assumed to be identical.

3.3.6 For analytical purposes in the theory of supply it is useful to consider a firm in two distinct time periods. (This distinction differs from the need to state the rate at which a firm produces output (3.2.2), i.e. bottles of bourbon produced per hour/day/week/month/year.) The two time periods are defined with reference to the ability of the firm to increase or decrease the quantity of different factors of production which the firm is able to hire or fire. They are not associated with strict time intervals, e.g. hours, days, weeks, months or years.
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3.3.6.1 When a firm decides to change the rate at which it produces goods, certain factors of production cannot be altered in quantity. The factor whose quantity cannot be altered immediately is known as a fixed factor of production. The factor of production which can be altered and consequently will determine the change in the rate of production is known as the variable factor of production. Normally capital is assumed to be the fixed factor and labor the variable factor.

Example. During the War many firms were asked to increase their rate of production of war materials. They were able to do so by hiring more labor and working two or three shifts instead of one, i.e. in some cases a 24 hour day was worked. The number of buildings and the amount of plant and equipment remained unaltered but were combined with more labor to produce more output. In this example labor is the variable factor of production and the buildings and equipment are the fixed factors of production.

3.3.6.2 The time period during which certain factors of production cannot be altered in terms of quantity hired is known as the short run. The time period during which all factors of production can be varied is known as the long run.

Example. If an automobile manufacturer can alter the production of cars in any given week by changing the number of line workers, but if in that week cannot alter the size of factory or assembly lines, plant and equipment, etc., such a period would be a short run period. Conversely, a firm may have an agreement with a union to hire only a given number of workers in a 6 month period, but can alter the number of machine tools within that period. This firm would also be in a short run decision making time period because the amount of labor is fixed.

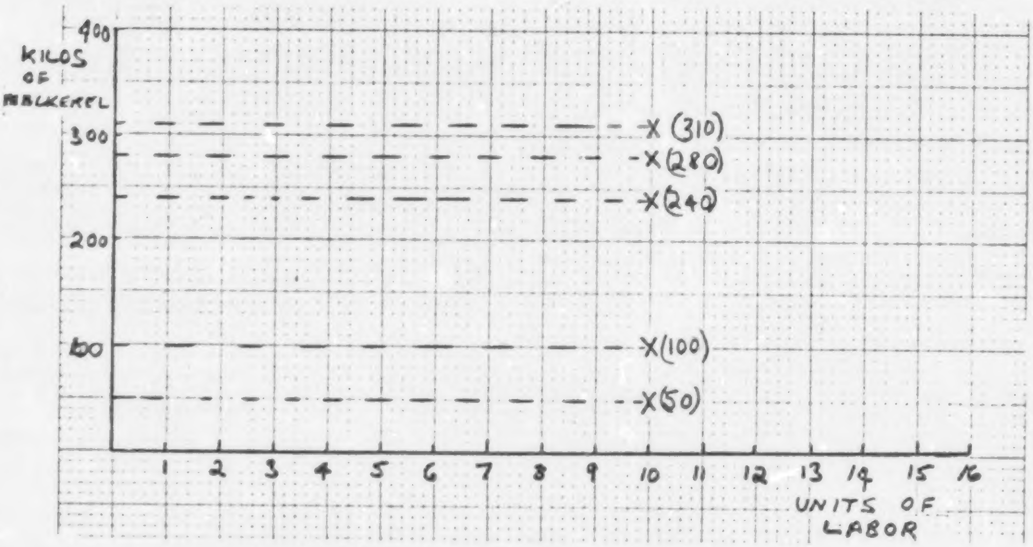
When the firm can vary all factors of production, i.e. increase or decrease labor and increase or decrease all capital inputs, e.g. a firm planning a supermarket when no commitments have been made, the firm is operating in the long run.

3.4 Implications of the Assumptions

3.4.1 For a given amount of the variable factor of production, in combination with the fixed factor of production, there is a maximum amount of output which can be produced. This will occur when the firm operates in an engineering efficient manner. Also there will be an infinite number of output possibilities where the output is less than the maximum for the given inputs. Each of these outputs is engineering inefficient because it is possible to increase output without an increase in any factor of production.

Example. Imagine the case of a sports fishing boat which, with a crew of 10 comprising both sailors and fishermen, can catch a maximum of 310 kilos of mackerel in one day's fishing.

Diagram 3.4.1(1) Maximum Fish Catch of 10 Crew/Fishermen



The diagram shows that while the maximum output (the catch) is 310 kilos, any amount, such as 280 kilos, is possible. Such outputs less than 310 are engineering inefficient. (It will be assumed that the Captain can always find the shoals of mackerel and that the number of fish caught depends only on the quantity and quality of the factors of production.)

3.4.2 For different amounts of the variable factor of production, combined with the fixed factor of production, there is a maximum set of outputs. The curve which traces these maximum outputs is the production frontier or the productivity curve of the variable factor of production. All points on the production frontier are engineering efficient; all points under the frontier are engineering inefficient.

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Example. The following data refer to possible mackerel catches on the sports fishing boat of 3.4.1. The fish are caught by rods which are fixed to the side of the boat.

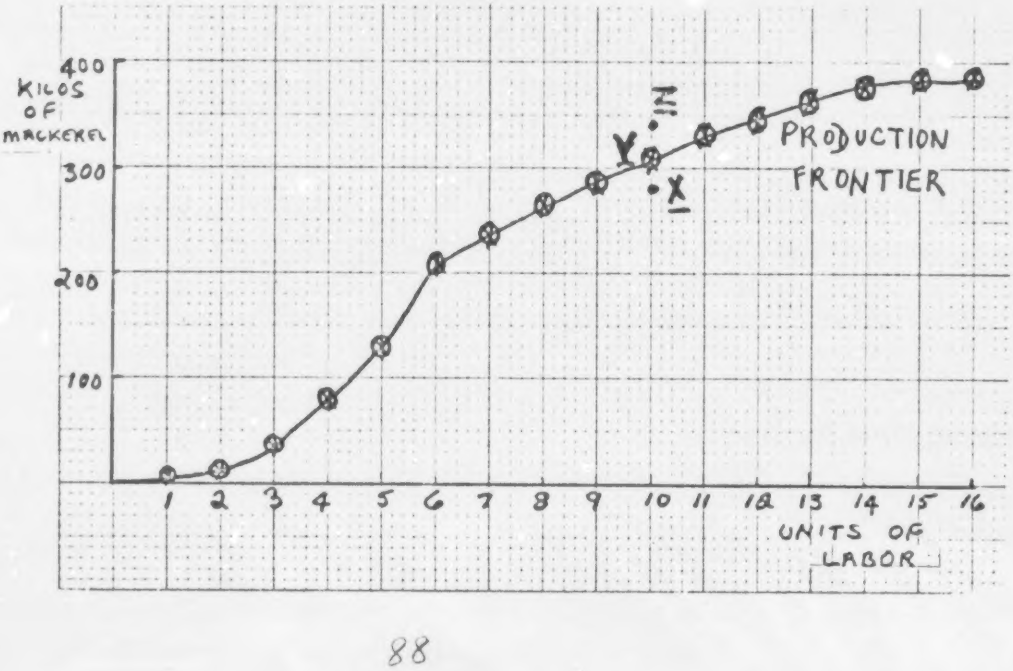
Table 3.4.2(1) Maximum Mackerel Catches possible by varying the Number of Crew/Fishermen

Number of crew	Kilos of Mackerel	Number of crew	Kilos of Mackerel
0	0	9	288
1	1	10	310
2	10	11	330
3	36	12	348
4	80	13	364
5	130	14	378
6	210	15	384
7	238	16	384
8	264		

In a given day, if there is only one man on the boat, the most he can catch is 1 kilo since the bulk of his time is spent piloting the boat. With 2 men on board, i.e. with two man days of labor, more attention can be devoted to catching fish and the maximum possible input is 10 kilos, though many fish striking the bait are lost because labor is not available to man all the rods. When 15 or more men are on board however, a maximum quantity of fish, 384 kilos, can be caught; in this case all rods are manned and the addition of more crew does not add to the output of fish caught.

The production frontier in Diagram 3.4.2(1) is constructed by joining the points in Table 3.4.2(1). (See 2.3.8 for the construction of diagrams in economics.)

Diagram 3.4.2(1) The Production Frontier for Catching Mackerel



Points such as X (280 kilos with 10 units of labor) lie within the production frontier, i.e. it is possible for 10 men to catch only 280 kilos of mackerel if they do not fish efficiently, or throw fish back. Point Y (310 kilos with 10 units of labor) lies on the production frontier because this is the maximum amount of fish which 10 men can catch in a day. Point Z (340 fish with 10 units of labor) is unattainable and lies outside the production frontier.

3.4.3 The production frontier will shift if the amount of the fixed factor of production changes.

Example. Suppose that in example 3.4.2 the amount of capital (boats, rods, etc.) doubles. With fewer than 11 men the total fish caught will be maximized if 1 boat is used, but with 11 or more men the amount which can be caught will increase.

Table 3.4.3(1) shows the possible catch with 1 boat (i.e. with only one unit of capital) and for two boats (i.e. two units of capital).

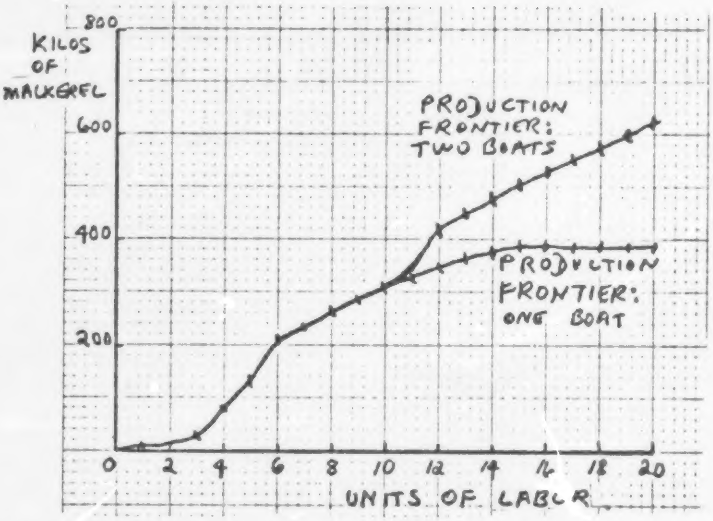
Table 3.4.3(1) Possible Mackerel Catch with 2 Boats

1 Boat		2 Boats		
Number of Crew	Kilos of Mackerel	Boat A No. of Crew	Boat B No. of Crew	Kilos of Mackerel
1	1	1	0	1
2	10	2	0	10
3	36	3	0	36
4	80	4	0	80
5	130	5	0	130
6	210	6	0	210
7	238	7	0	238
8	264	8	0	264
9	288	9	0	288
10	310	10	0	310
11	330	6	5	340(210+130)
12	348	6	6	420(210+210)
13	364	7	6	448(238+210)
14	378	7	7	476(238+238)
15	384	8	7	502(264+238)
16	384	8	8	528(264+264)
17	384	9	8	552(288+264)
18	384	9	9	576(288+288)
19	384	10	9	598(310+288)
20	384	10	10	620(310+310)

For small numbers of men it is not efficient to use both boats. This occurs because if 2 men each took out 1 boat each, they would be able to catch only 2 kilos in total, whereas if they were to go on the same boat they would catch a total of 10 kilos. For 11 or more men more fish can be caught if both boats are employed.

The following diagram shows the production frontier in the two cases.

Diagram 3.4.3(1) Doubling Capital: a Shift in the Production Frontier



The production frontier does not differ for up to 10 men; beyond this it is higher for two boats.

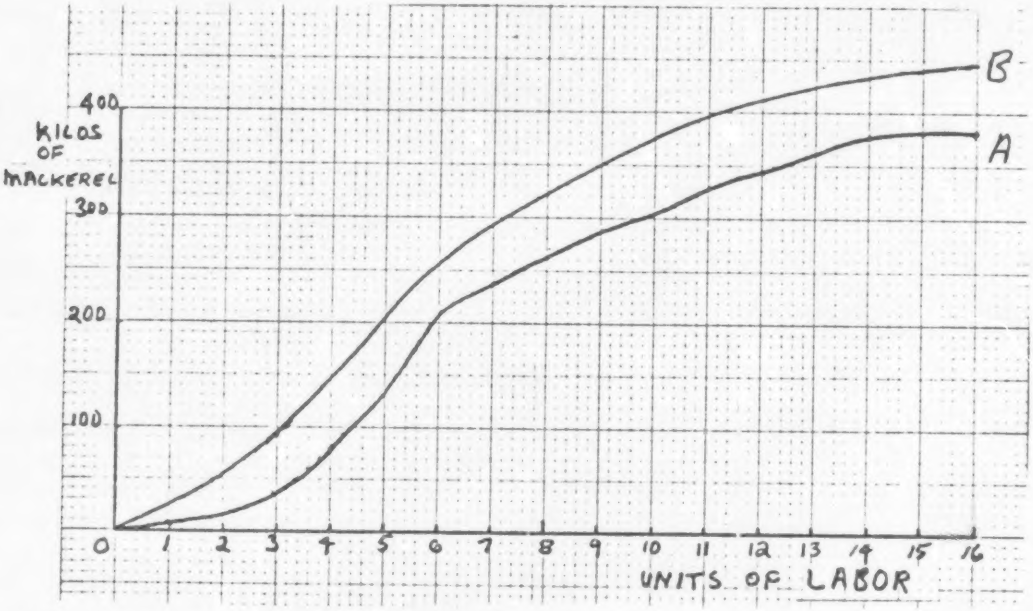
3.4.4 The production frontier can change if:

1) better methods are found to combine the variable factor of production with the fixed factor; and/or
2) the quality of the factor of production changes.

(Note that this violates the assumption of 3.3.2, that factors of production are homogeneous.)

Example. The following diagram shows the original production frontier (OA) together with that for a boat fitted with electric spin reels (OB), which enables more fish to be caught at each unit of labor input because of the greater speed with which fish can be landed.

Diagram 3.4.4(1) A Change in the Production Frontier



3.4.5 It is generally accepted that the production frontier is not linear, i.e. additional units of the variable factor of production do not produce equal increases in output. The normal assumption is that up to a certain level of output (each unit being produced in an engineering efficient manner) increases in the variable factor of production will yield proportionately greater increases in output, and after a certain level of output increases in the variable factor of production will yield less than proportional increases in output. Ultimately, a level of output will be reached where increases in the variable factor of production will not yield any increase in output.

Example. In example 3.4.2 the addition of a second unit of labor, i.e. an increase of 100%, added 9 units of output, i.e. an increase of 900%. The addition of a 3rd unit of labor (a 50% increase) caused output to rise from 10 to 36 (an increase of 260%).

Up to the addition of the 6th unit of labor the proportionate increase in output exceeds the proportionate increase in labor. From 7 units of labor up to 15 units of labor each additional unit of labor, while causing output to rise, causes it to rise less than proportionately to the increase in labor. A 10% increase in labor (from 10 to 11 units) causes output to increase by 6% (from 310 kilos to 330 kilos). The addition of labor after 15 units were already employed causes no increase in output.

Possible explanations for this phenomenon lie in the scope for the specialization of activities. For example, in employing up to 6 men in the boat, one man pilots the boat, one man nets the fish caught, one man attends to the rods at the bow, another to the rods on the starboard side, and so on. As more units of labor are added each person attends to fewer rods resulting in more fish being caught, but the amount caught by each additional man decreases. When 15 men are on board all rods are manned and associated fishing and piloting functions are fully taken care of. The addition of further units of labor can therefore add nothing to the catch.

3.4.6 A necessary but not sufficient condition for firms to maximize profits is that they produce output in an engineering efficient manner, i.e. they operate on the production frontier. If a firm were producing under the frontier, total output from the factors of production employed would not be a maximum and consequently the costs of producing that output would not be minimized. As a result profit would be less than it otherwise could be.

Example. In example 3.4.2 assume that two identical fishing boats set out each with 10 men on board. Assume that one boat operates on the production frontier and catches 310 kilos of mackerel worth $310. However, the second operates under the production frontier and catches only 280 kilos of mackerel worth $280. Since the boats are identical in terms of the factors employed the costs of producing $310 worth of mackerel on the first boat will be the same as producing $280 worth of mackerel on the second boat. Since the revenues from the catches differ while costs are equal profits will differ.

3.4.7 To analyze supply it is necessary to consider a firm in both the short run and the long run (3.3.6.2), analyze the different amounts and combinations of factor inputs (study of productivity), and the costs associated with each output. First, the productivity of the firm in the short run will be considered and the concepts of total, average and marginal product (output) will be developed. It will be assumed that the firm operates in an engineering efficient manner.

3.4.7.1 Total product is the maximum amount of output which can be produced from different amounts of the variable input in combination with the fixed factor input. The total product schedule is the production frontier (3.4.2).

Example. In diagram 3.4.2(1) the production frontier OPF is the total product, or output, schedule of the mackerel catching firm. In the real world, firms attempt to operate on their production frontiers and hire additional labor when they wish to/

to expand output and fire labor when they contract output. The increase in labor hired by the major U.S. automobile manufacturers in the 60s and the large numbers laid off in the mid 70s result from firms operating on or close to their production frontiers.

3.4.7.2 Average product is calculated by dividing total product by the number of units of variable input. When capital is the fixed factor input and labor is the variable factor input such a calculation will yield the average product of labor, i.e.

$AP_\ell = Q/L$ where AP_ℓ = average product of labor
Q = output
L = units of labor

The average product concept is used by firms in efficiency studies, i.e. in assessing how productive, on average, their labor force is compared to the labor force in other firms.

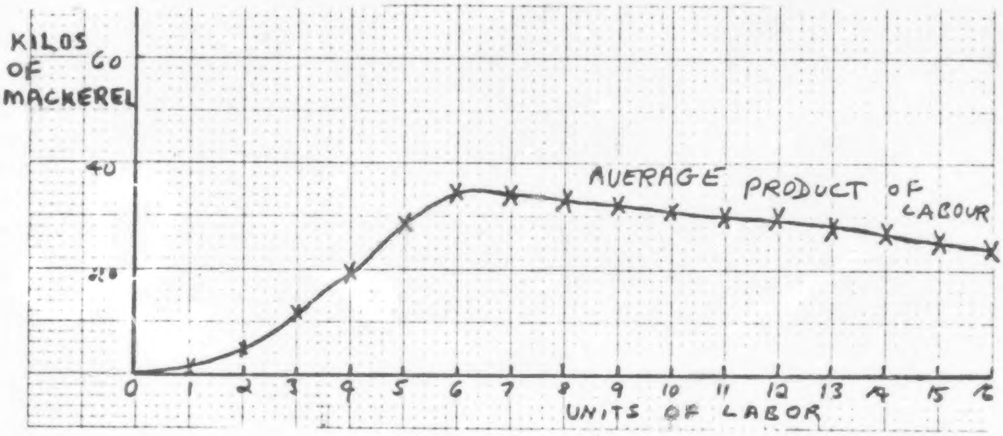
Example. The average product of labor can be calculated from the output and labor data in Table 3.4.2(1) as follows:

Table 3.4.7.2(1) The Average Catch of Mackerel (Kilos)

N	TP	AP
0	0	0
1	1	1
2	10	5
3	36	12
4	80	20
5	130	26
6	210	35
7	238	34
8	264	33
9	288	32
10	310	31
11	330	30
12	348	29
13	364	28
14	378	27
15	384	25.6
16	384	24

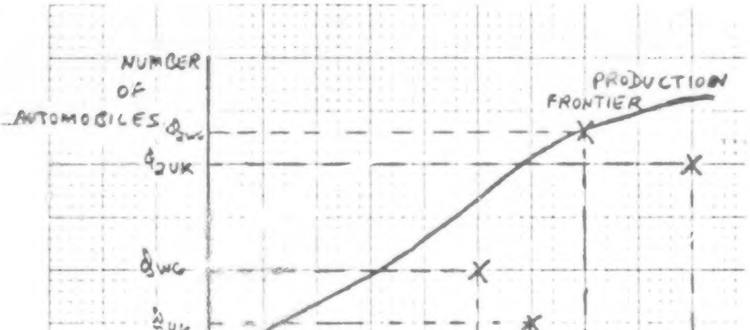
When 4 men are hired on the fishing boat a catch of 80 kilos of mackerel results; the average product of labor is 20 (80/4) kilos of mackerel. Average product of labor increases as labor increases until a maximum is reached when 6 men are hired. Thereafter it declines. The pattern of average product of labor is plotted below, and this is typical of most production situations.

Diagram 3.4.7.2(1) The Average Product of Labor in Catching Kilos of Mackerel



Example 2. The practical significance of the concept of the average product of labor can be shown by the use to which it was put by Mr. Ford, President of the Ford Motor Company, in assessing the firm's European operations. A comparison of the average product of labor in the Ford plant in the U.K. and West Germany showed that the AP_L *in the U.K. was significantly lower than the* AP_L *in West Germany. The difference could not be accounted for by any difference in the amount of fixed factor of production, i.e. capital, nor by the U.K. and West German plants operating at different points on the production frontier since the U.K. operation was employing more men and producing fewer automobiles than the West German counterpart. These facts do not guarantee that the West German plant was on the production frontier but they do guarantee that the U.K. plant was not. Diagram 3.4.7.2(2) shows possible alternatives explaining Mr. Ford's concern.*

Diagram 3.4.7.2(2) The Production Frontier for Automobiles



Note: Many textbooks erroneously have the total product curve turn down, e.g. to pass through the point L_{2uk}, Q_{2uk}. *Since the production frontier traces only maximum possible quantities of output from different amounts of labor, point* L_{2uk}, Q_{2uk} *must lie within the frontier. The argument that additional units of labor "get in the way" of other workers causing total output to decrease implies that space is limited, and consequently space would become a factor of production.*

3.4.7.3 Marginal product of a factor is the change in output attributable to a change in the quantity of that factor hired at a given level of employment of that factor. The concept has meaning in considering only small changes in the amount of the variable factor. The general formula for marginal product of a variable factor is

$$MP_{VF} = \frac{Q}{VF}$$

In 1.3 the importance of marginal analysis in problems involving maximization was shown. In hiring the optimal number of units of labor the firm requires information on the MP at each level of employment. Consequently the concept of marginal productivity is critical to efficiency in the theory of supply.

Example. The marginal product of labor can be derived from the total product schedule of the example in 3.4.2.

Table 3.4.7.3(1) The Marginal Product of Labor employed in Catching Mackerel

N	TP	(kilos) AP	(kilos) MP
0	0	0	
1	1	1	1
2	10	5	9
3	36	12	26
4	80	20	44
5	130	26	50
6	210	35	80
7	238	34	28
8	264	33	26
9	288	32	24
10	310	31	22
11	330	30	20
12	348	29	18
13	364	28	16
14	378	27	14
15	384	25.6	6
16	384	24	0

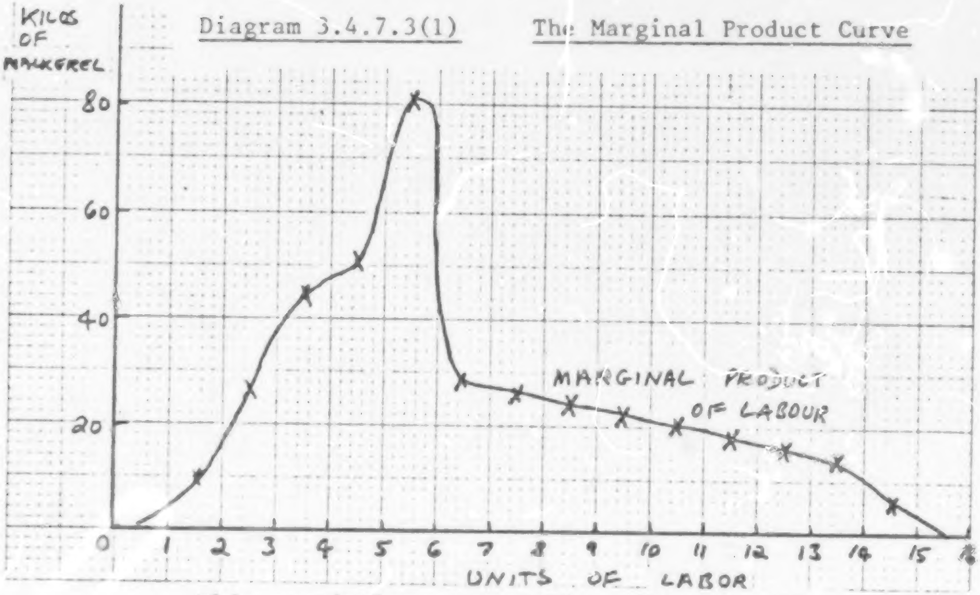
The employment of the first worker results in 1 kilo of mackerel caught. The addition of another worker adds 9 kilos to the catch, given that the first worker is already employed. Thus the ML_1 *when one worker is already employed* $= \frac{Q}{L} = \frac{9}{1}$ *i.e.* $\frac{(10 - 1)}{1}$ *The addition of the 3rd worker adds 26 kilos to the catch, while the addition of the 4th worker adds 44 kilos. Thus the total output (catch) of 4 workers is* $1 + 9 + 26 + 44 = 80$ *kilos, i.e. the sum of the marginal products of L up to the number of units employed.*

Marginal product increases up to a point, and reaches a maximum when 5 workers are employed, since the 6th worker would add more to output than any previous or subsequent worker.

Note: Marginal products usually are not attributed to individual workers. The 12th worker, for example, does not catch 18 kilos of mackerel, he may prepare bait. When 11 workers are employed and a 12th is added the total catch increases by 18.

The marginal product of labor is shown diagrammatically below:

Diagram 3.4.7.3(1) The Marginal Product Curve



This particular curve follows the generally accepted pattern of marginal product curves: it increases up to some maximum and then diminishes to zero.

(Note: the analysis of total, average and marginal product has been discussed in terms of output produced, i.e. physical units of output. For this reason the terms should be strictly defined/

defined as Total Physical Product, Average Physical Product, and Marginal Physical Product. When output units are expressed in money terms a different terminology will be used; unless otherwise stated TP, AP and MP will refer to physical units of output.)

3.4.7.4 Starting with the total product schedule, the average and marginal product schedules of the variable factor input were derived. It follows that there will be a number of relationships between these three variables. The most important of these are as follows:

i) When TP = 0, AP = 0

ii) When AP is maximum, AP = MP

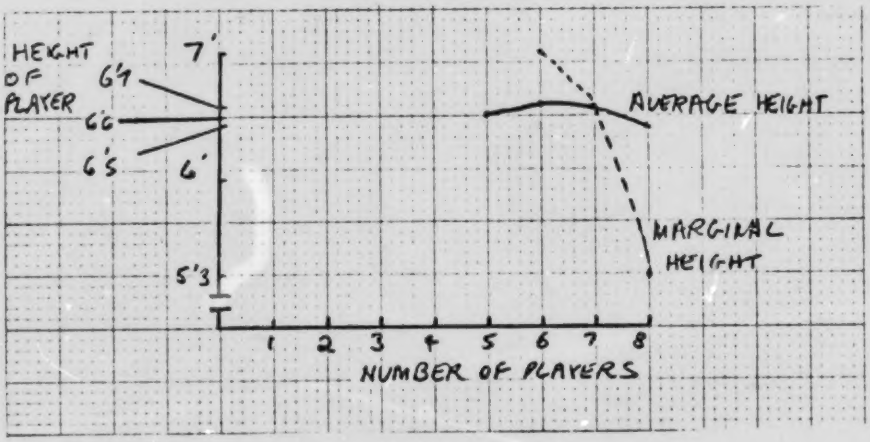
iii) When MP is greater than AP, AP is increasing

iv) When MP is less than AP, AP is decreasing

v) When the change in TP = 0, MP = 0

Example. Suppose a basketball squad of 5 players has an average height of 6'6" and three additional players are added to the pool by height, i.e. tallest first, smallest last. The three reserves are 7', 6'7" and 5'3". When the player is added whose height is greater than the average, it follows that the average height of the pool must rise, i.e. the addition of the 7' player increases the average height from 6'6" to 6'7". The addition of the 6'7" player neither raises nor lowers the average height at this stage because his height is equal to the average. The addition of the 5'3" player has the effect of reducing the average to 6'5". The following diagram shows what happens to the average height of the basketball pool when the three players are added.

Diagram 3.4.7.4(1) The Height of the Basketball Pool

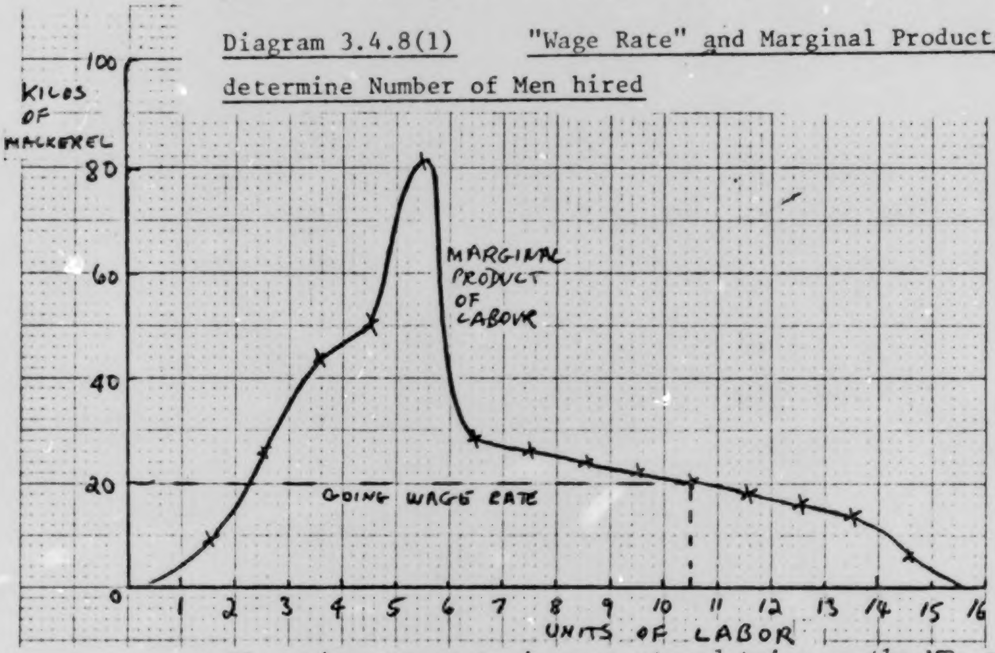


3.4.8 The marginal product concept is of fundamental importance to decision making on the part of the firm. The rule which a profit maximizing firm must follow in hiring factors of production is: the firm will continue to hire a factor of production up to the point at which the value of its marginal product just equals the going rate or unit cost of the factor hired.

Example. Assume that a mackerel catching firm has to pay the going rate of 20 kilos of mackerel for each unit of labor hired. How many units of labor (man days) will the firm of 3.4.2 hire? It will pay the firm to hire labor up to the point at which the $MP_l = 20$ *kilos of mackerel, i.e. the firm will hire 10 men and since the* MP_l *when 10 men are hired =20, the firm will be indifferent about hiring the 11th man. If the firm were to hire a 12th man the additional cost to the firm would be 20 kilos of mackerel (the going rate) but the additional catch would only be 18 kilos. Hiring of the 12th man would involve the firm in a net loss of 2 kilos of mackerel.*

Note: The hiring of 12 men would cost the firm 240 kilos of mackerel (20 x 12) and the resulting catch would be 348 kilos, yielding a net catch to the owner of the firm of 108 kilos (348 - 220), or if only 10 men are hired, 110 kilos (310 - 200). This is an application of the marginal analysis of 1.3 and yields the correct output decision for the profit maximizing firm. This result can be shown diagrammatically:

Diagram 3.4.8(1) "Wage Rate" and Marginal Productivity Curve determine Number of Men hired



The going wage rate is encountered twice on the MP_L *schedule, but the increasing portion of the curve is irrelevant to profit maximizing behavior.*

3.4.9 The next step in investigating firm supply requires the conversion of productivity data to cost data. This is necessary because the productivity results are particular to the firm analyzed, while the conversion to a unit of exchange (money) allows conclusions of greater generality to be drawn. The same assumptions are used as in the productivity analysis, i.e. that the firm is analyzed in the short run using 2 factors of production, that it is a price taker in the market for factors of production and its output, and that it is a profit maximizer.

3.4.9.1 The total cost of producing any good equals the amount of each factor of production employed multiplied by the price of each of these factors.

Example. The total cost of catching mackerel will be determined by the rental cost of the boat and the number of men, rods, etc. hired, times their respective unit costs, i.e.

$TC = Cp_c + Lpe$

Note: $TC = C_l p_l - C_n p_n + L_l p_l - L_n p_n$

3.4.9.2 The total cost of production is comprised of two elements. First, the cost of the fixed factor which the firm must pay even if it produces zero output. Since the quantity of the fixed factor does not vary with the level of output the cost of the fixed factor does not vary with the level of output. This cost is known as fixed cost. Second, the cost of the variable factor, on which the firm's spending will vary with the amount of the factor hired. This cost is known as variable cost.

Thus TC = VC + FC where TC = total cost

VC = variable cost

FC = fixed cost

Example. Using the example of 3.4.2, assume that the fixed cost is $100 (i.e. the cost of the boat, rod, bait, etc.) to the firm each day. Further, assume that each unit of labor, i.e. one 24 hour day, is $100. Table 3.4.9.2(1) shows the cost of each amount of mackerel caught calculated from the productivity data in 3.4.2.

Table 3.4.9.2(1) The Total Cost of Catching Mackerel

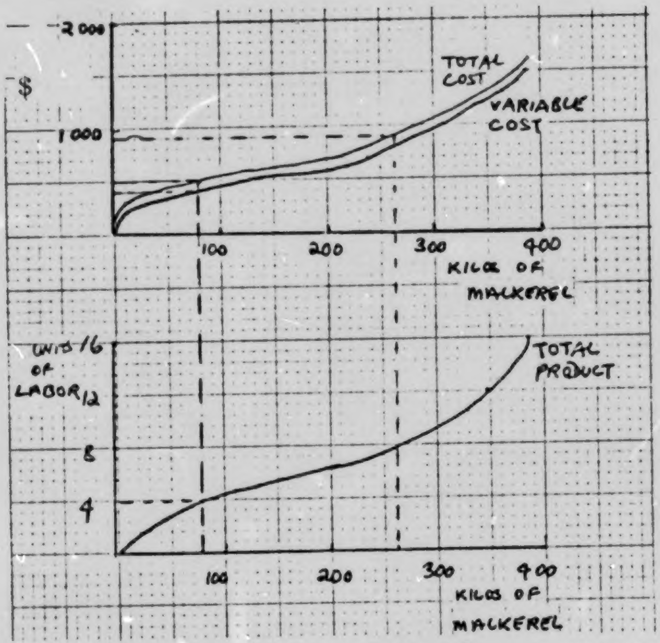
Total Product (Kilos of Mackerel)	Fixed Cost ($)	Units of Labour	Price per Unit of Labour ($)	Variable Cost ($)	TC=VC+FC
0	100	0	0	0	100
1	100	1	100	100	200
10	100	2	100	200	300
36	100	3	100	300	400
80	100	4	100	400	500
130	100	5	100	500	600
210	100	6	100	600	700
238	100	7	100	700	800
264	100	8	100	800	900
288	100	9	100	900	1000
310	100	10	100	1000	1100
330	100	11	100	1100	1200
348	100	12	100	1200	1300
364	100	13	100	1300	1400
378	100	14	100	1400	1500
384	100	15	100	1500	1600
384	100	16	100	1600	1700

The table shows the total cost associated with each level of output; for example, 264 kilos of mackerel cost a total of $900 to catch. This cost is comprised of FC = $100 + VC = $800.

3.4.9.3 Since increases in output require increases in factor inputs total cost of production will increase as output increases. However, since a given increase in the amount of the variable factor of production employed does not necessarily result in proportional increases in output (3.4.5), the relationship between cost of production and output will be positive but not necessarily fixed.

Example. In diagram 3.4.9.3(1) output and cost data (Table 3.4.9.2(1)) and output and variable input data (Table 3.4.2(1)) are plotted.

Diagram 3.4.9.3(1) Total and Variable Costs related to Productivity



The relationships between the various curves can be traced out. For example, 4 units of labor, given fixed factor inputs, produce a catch of 80 kilos of mackerel (point A). The cost of 80 kilos of mackerel is $500 (point B), which can be broken down into variable cost of $400 (point C) and fixed cost $100 ($500 - $400).

Eight units of labor input yield a total catch of 264 kilos of mackerel. The concomitant total cost is $900 of which VC = $800 and FC = $100, i.e. a doubling of the variable input results in much more than a doubling of output.

The shape of the total cost curves are thus determined by the shape of the productivity curves.

3.4.9.4 Average Cost: the average cost of output for each level of production (average cost of production) is calculated by dividing total cost by output, i.e.

ATC = TC/Q where ATC = average total cost
TC = total cost
Q = output

Similarly, AVC = VC/Q   where AVC = average variable cost.
Since TC = VC + FC (3.4.9.2) then TC/Q = VC/Q + FC/Q, i.e.
ATC = AVC + AFC.

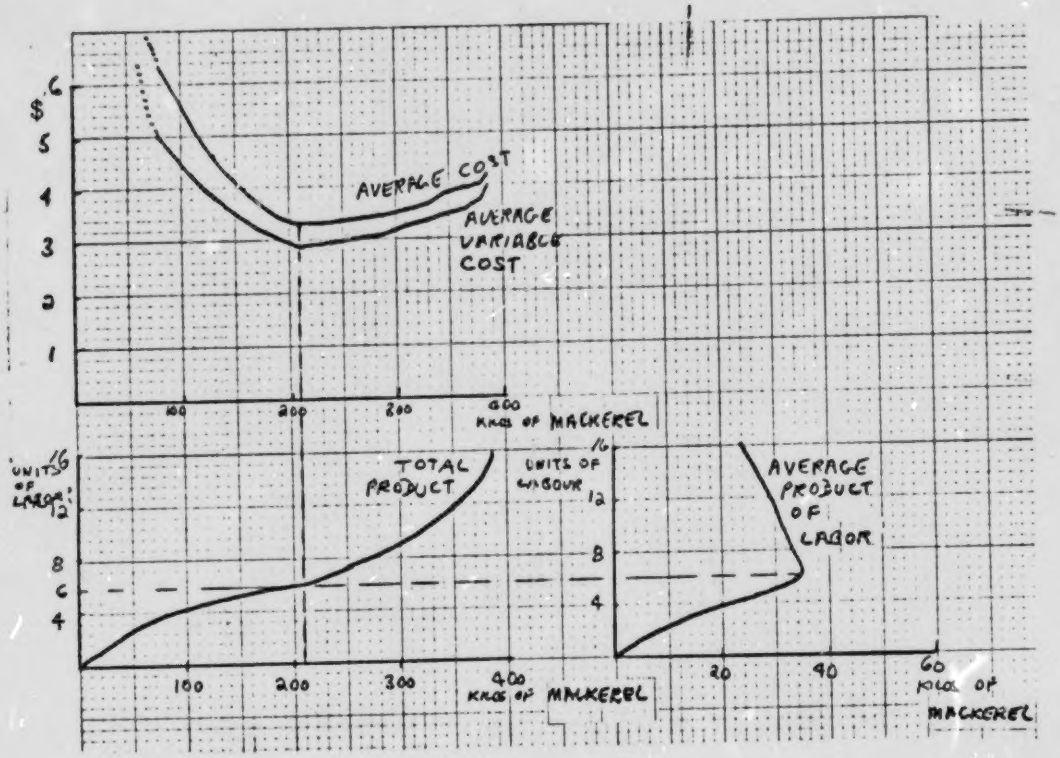
Example. The ATC and AVC can be found by performing the calculations on the data in Table 3.4.9.2(1) to give the following:

Table 3.4.9.4(1)   Average Total Cost, Average Variable Cost and Average Fixed Cost

TP	ATC	AVC	AFC
1	200.00	100.00	100.00
10	30.00	20.00	10.00
36	11.11	8.33	2.78
80	6.25	5.00	1.25
130	4.62	3.85	0.77
210	3.33	2.86	0.47
238	3.36	2.94	0.42
264	3.41	3.03	0.38
288	3.47	3.13	0.34
310	3.55	3.23	0.32
330	3.64	3.33	0.31
348	3.74	3.45	0.29
364	3.85	3.57	0.28
378	3.97	3.70	0.27
384	4.17	3.91	0.26
384	4.43	4.17	0.26

As output increases, AFC decreases since a fixed amount is being divided by an ever-increasing number of units of output. Consequently, the greater is output the smaller will be AFC and consequently the smaller will be the difference between ATC and AVC. The data in Table 3.4.9.4(1) are plotted in conjunction with the productivity data in Table 3.4.7.2(1) to illustrate the general pattern of average cost and the relationship between average productivity and average costs.

Diagram 3.4.9.4(1) Average Cost and Average Productivity Curves



The shape of the AVC is inversely related to the AP_L: when AVC is minimum, i.e. at 210 units of output, AP_L is maximum, i.e. 35 units. Thus the shape of the AVC curve is determined by the shape of the AP_L curve.

3.4.9.5 Marginal cost: the marginal cost is the cost of producing an additional unit of output, i.e.

$C_{n+1} - C_n$ where C_n = cost of producing n units of output

C_{n+1} = cost of producing n+1 units of output.

Example. The data in the fishing boat example do not yield the marginal cost of kilos of mackerel directly, i.e. the cost of catching an additional kilo of mackerel at each level of output. Instead, the data tell the number of additional mackerel /

mackerel caught for the addition of one unit of labor for each number of units already employed. An approximation to the marginal cost of mackerel at each level of output can be calculated by dividing the increase in costs associated with hiring one additional unit of labour by the extra mackerel caught. For example, the hiring of the 5th unit of labor causes output to increase from 80 kilos of mackerel to 130 kilos, i.e. an increase of 50 kilos of mackerel. The cost of the 5th unit of labor is $100. Thus the cost of catching 50 additional kilos of mackereal when 80 were already being caught is $100. Thus the cost of each additional kilo of mackerel on average is $2 ($100/50); this is the marginal cost of mackerel when 80 are being caught. If, when 80 kilos of mackerel are already caught, 1/50th of a unit of labor could be hired for $2 and if 1/50th of a unit of labor caught 1 additional kilo of mackerel the same result would be achieved.

The data available, therefore, because of discontinuities, yield the "average marginal cost of kilos of mackerel". The marginal cost of mackerel is set out in Table 3.4.9.5(1).

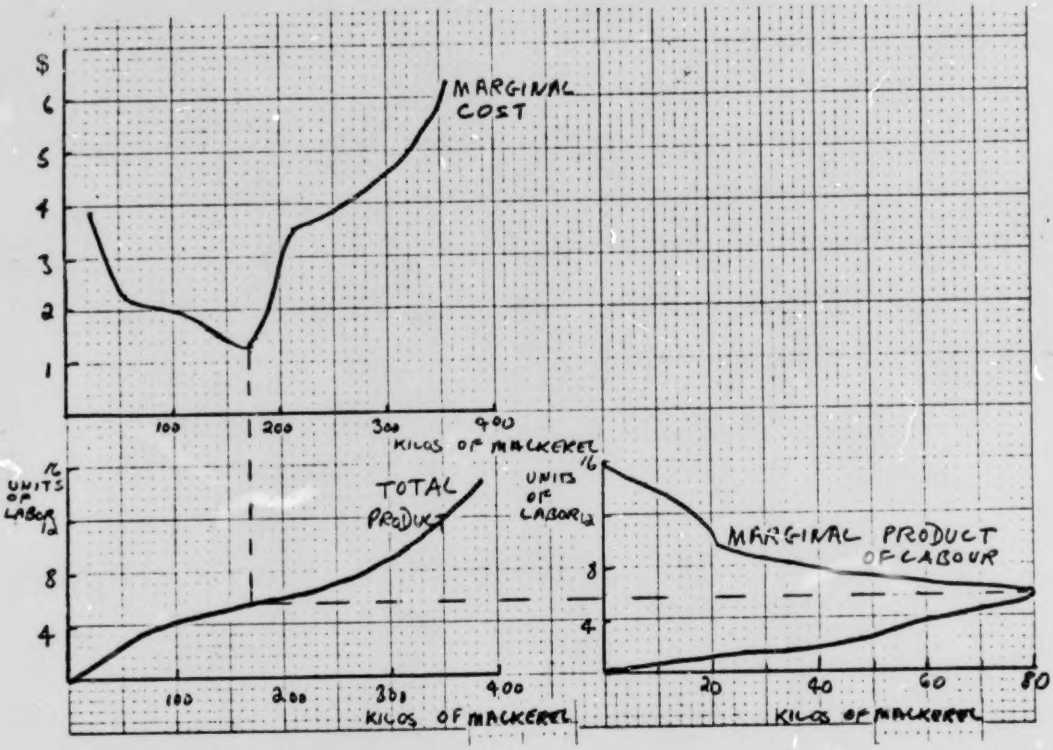
Table 3.4.9.5(1) The Marginal Cost of Kilos of Mackerel

TP	MP	Wage Rate	Marginal Cost
0	1	100	100.00
1	9	100	11.11
10	26	100	3.85
36	44	100	2.27
80	50	100	2.00
130	80	100	1.25
210	28	100	3.57
238	26	100	3.85
264	24	100	4.17
288	22	100	4.55
310	20	100	5.00
330	18	100	5.56
348	16	100	6.25
364	14	100	7.14
378	6	100	16.67
384	0	100	
384		100	

The marginal cost is high at low levels of output, declines to $1.25 and thereafter increases. It is clear that the marginal cost is determined by the MP_l and the cost of L.

The marginal cost curve is plotted in Diagram 3.4.9.5(1) together with the MP_l.

Diagram 3.4.9.5(1) The Marginal Cost Curve of Kilos of Mackerel



The lowest point of marginal cost occurs in the range of output 130 to 210, and in this range of output the marginal product of labor is highest. Given the price of the variable factor of production is constant, the shape of the marginal cost curve is therefore determined by the shape of the MP_l *curve.*

3.4.9.6 Starting with the total cost, the average total, average variable and marginal costs were derived, and it follows that there are a number of relationships between these three variables. The most important of these are as follows:

i) When Q = 0, TVC = 0 and TC = FC

ii) When ATC is a minimum, ATC = MC

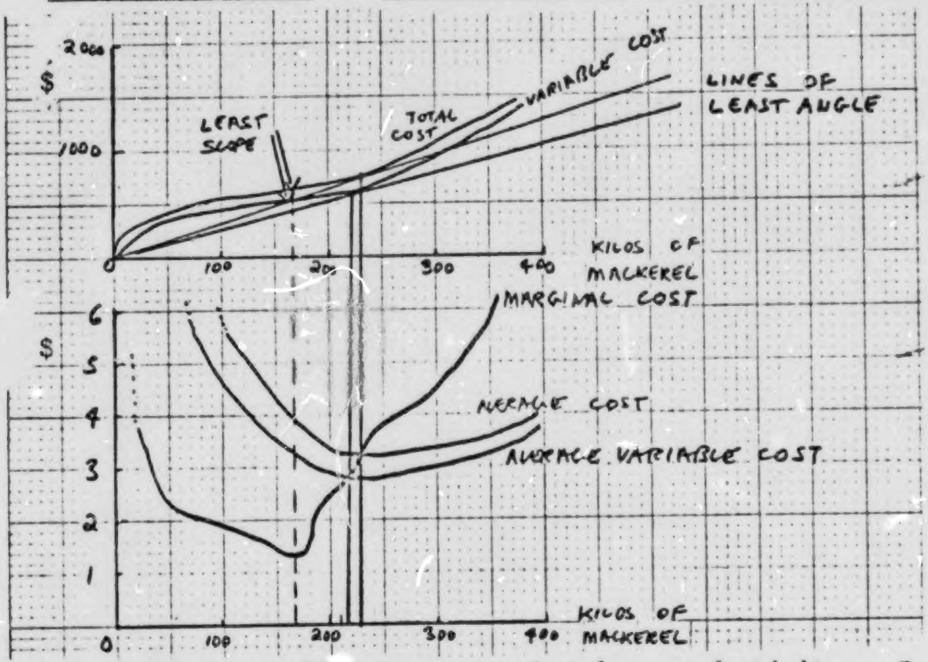
iii) When AVC is a minimum, AVC = MC

iv) When MC is greater than AC, AC is increasing

v) When MC is less than AC, AC is decreasing

Example. Similar to the derivation of MP and AC curves from the TP curve in 3.4.7.4, AC and MC are derived from TC, and the diagrammatic relationships between the curves are shown in Diagram 3.4.9.6(1).

Diagram 3.4.9.6(1) The Relationships Between Cost Curves



The features of these curves are based on productivity. In the range of output where MP_l is maximum, the MC of output (the slope of the TC curve) is minimum. Where AP_l is maximum, AVC is minimum. When AP is increasing, AVC is decreasing. The reasoning behind the characteristics of the different curves and the connections between them is similar to the basketball squad example of 3.4.7.4.

3.5 Firm Supply in the Short Run

3.5.1 The productivity and cost relationships provide the base for determining how much output a firm will supply. In analyzing firm supply in the short run the assumptions of the firm producing only one good and being a price taker in both product and factor markets will be maintained. How much output will the firm supply to meet its objective of profit maximization? Profits are maximized when total revenue - total cost is maximum, i.e., P x Q - TC is a maximum.

Example. Suppose the selling price of mackerel is $5 per kilo. Using the total cost curve of the mackerel fishing boat it is possible to compare the revenues obtained from selling each quantity of mackerel with the costs of producing it. Table 3.5.1(1) sets out the total cost of producing mackerel from Table 3.4.9.2(1) with the revenue from each level of sales.

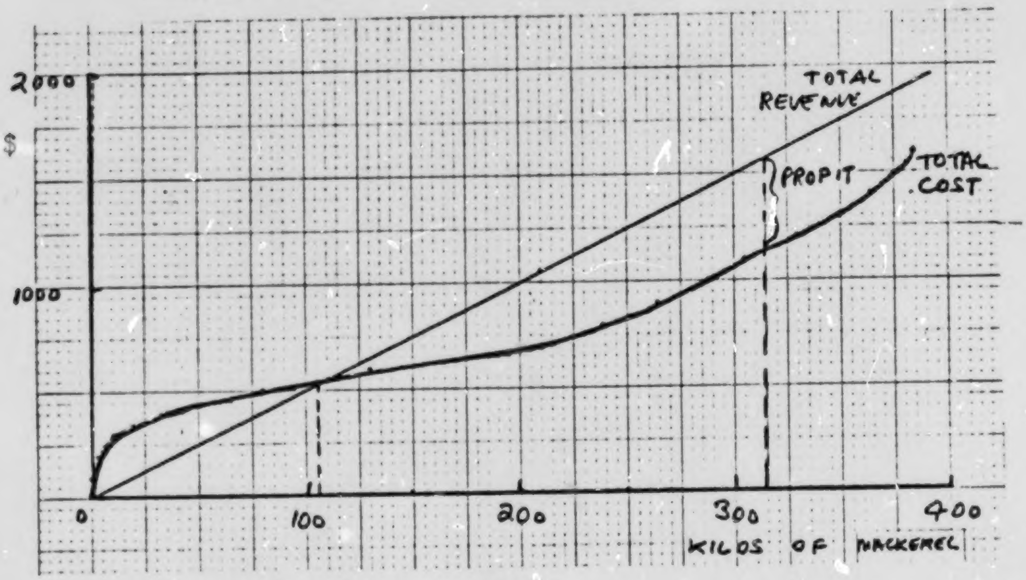
Table 3.5.1(1) Revenues, Costs and Profits

Total Product (Kilos of Mackerel)	Total Cost	Total Revenue (TP x $5)	Profit (TR-TC)
0	100	0	-100
1	200	5	-195
10	300	50	-250
36	400	180	-220
80	500	400	-100
130	600	650	50
210	700	1050	350
238	800	1190	390
264	900	1320	420
288	1000	1440	440
310	1100	1550	450
330	1200	1650	450
348	1300	1740	440
364	1400	1820	420
378	1500	1890	390
384	1600	1920	320
384	1700	1920	220

It is clear that the level of output giving maximum profit lies between 310 and 330 units.

The data can be presented in diagram form as in Diagram 3.5.1(1), in which the total cost curve is reproduced from Table 3.4.9.2(1) and the total revenue curve is a straight line drawn from the origin through the points in the total revenue column of Table 3.5.1(1).

Diagram 3.5.1(1) Revenues, Costs and Profits



It can be seen that there is one level of output between 310 and 330 where the difference between total cost and total revenue is a maximum.

3.5.2 Outputs where total cost = total revenue are known as "break even" points.

Example. In Table 3.5.1 the firm's total costs are greater than total revenues up to the range of output 80 to 130; between these two outputs exists a level of output at which total cost and total revenue are equal, i.e. the break even point. Above this range of output total cost is less than total revenue, i.e. the firm is making a profit. The problem which faces the firm is not to find the break even point but to find the profit maximizing level of output.

3.5.3 The selling price will determine whether the firm is able to cover its total cost of production; there are three distinct cases depending on the selling price:

i) the firm is able to cover all costs at certain levels of output and make a profit.

ii) the firm is able to cover variable cost but not total cost at certain levels of output.

iii) the firm is unable to cover variable cost at any level of output.

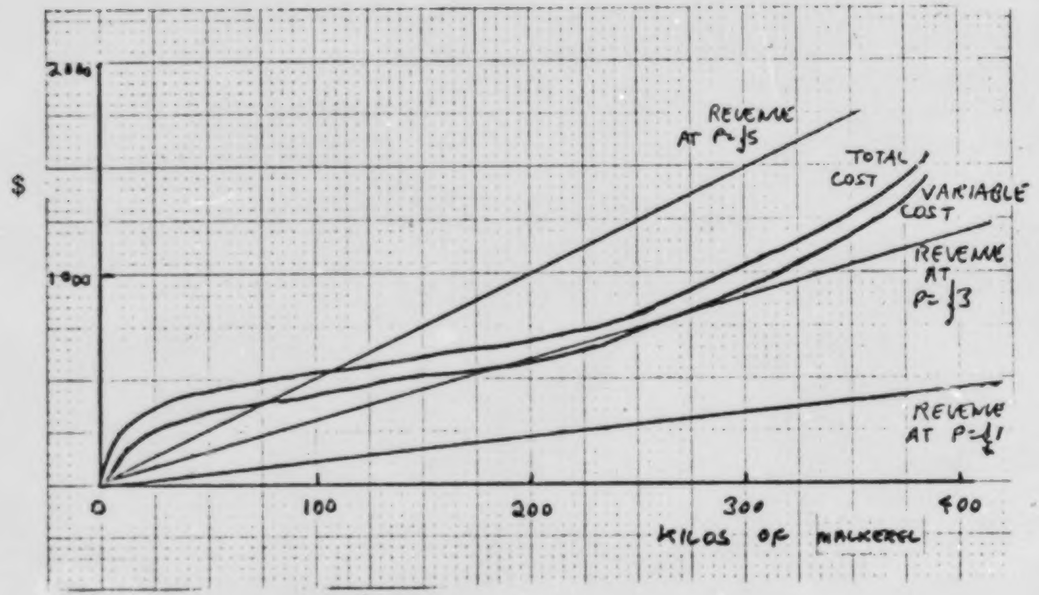
Example. *Table 3.5.3(1) elaborates on Table 3.5.1(1) by including the revenues and profits associated with selling prices of $1, $3 and $5.*

Table 3.5.3(1) Revenues and Profits at Different Selling Prices

Total Product	Total Cost	Variable Cost	Total Revenue at $1	$3	$5	Profit (TR-TC) at $1	$3	$5
0	100	0	0	0	0	-100	-100	-100
1	200	100	1	3	5	-199	-197	-195
10	300	200	10	30	50	-290	-270	-250
36	400	300	36	108	180	-364	-292	-220
80	500	400	80	240	400	-420	-260	-100
130	600	500	130	390	650	-470	-210	50
210	700	600	210	630	1050	-490	-70	350
238	800	700	238	714	1190	-562	-86	390
264	900	800	264	792	1320	-636	-108	420
288	1000	900	288	864	1440	-712	-136	440
310	1100	1000	310	930	1550	-790	-170	450
330	1200	1100	330	990	1650	-870	-210	450
348	1300	1200	348	1044	1740	-952	-256	440
364	1400	1300	364	1092	1820	-1036	-308	420
378	1500	1400	378	1134	1890	-1122	-366	390
384	1600	1500	384	1152	1920	-1216	-448	320
384	1700	1600	384	1152	1920	-1316	-548	220

While a profit is made at the selling price of $5 above the 80 to 130 range of output, neither selling prices of $1 nor $3 result in a profit at any level of output. However, at 210 and 238 units of output the selling price of $3 results in a revenue which is greater than variable cost, i.e. the firm is able to cover its variable cost and make some contribution to fixed cost. This situation is represented in Diagram 3.5.3(1).

Diagram 3.5.3(1) Revenue and Cost Curves

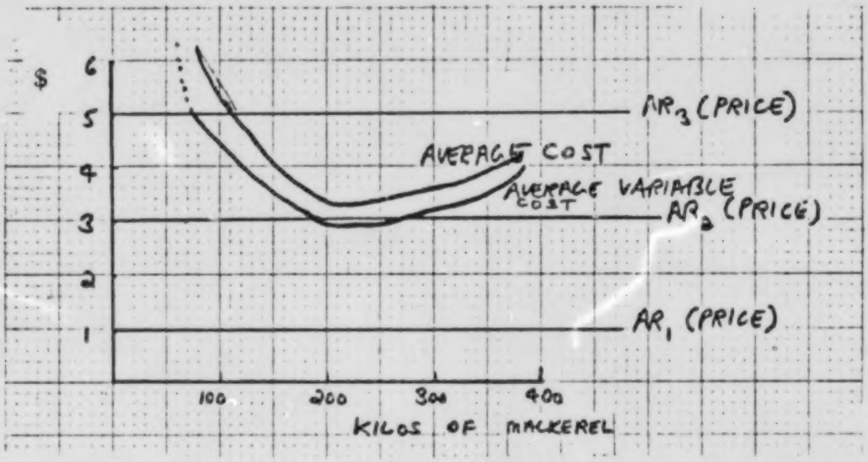


In the diagram the revenue curve for $3 never rises above the total cost curve but for a certain range of output it lies between the variable and the total cost curves. The revenue curve for $1 lies below both curves at all levels of output.

3.5.4 The same solution can be achieved by considering average revenue and average costs. Average revenue is calculated by dividing total revenue by output. If each unit sells for the same price average revenue will be constant and equal to price, for example if each of 10 pencils sells for 15c., total revenue from the sale of 10 pencils will be $1.50 and average revenue will be 15c., which equals price.

Example. Diagram 3.5.4(1) contains the average variable and average total costs from Diagram 3.4.9.4(1) together with the total revenue curves of Diagram 3.5.3(1) expressed as average revenue (price) curves.

Diagram 3.5.4(1) Average Revenue and Average Cost



At all levels of output the average revenue curve at a price of $1 per kilo lies below the average variable cost curve; there is a range of output for which the average revenue curve at a price of $3 lies between the average variable cost and the average total cost, and there is a range of output for which the average revenue curve at a price of $5 lies above the average total cost, i.e. the firm is making a profit.

3.5.5 An alternative to comparing TC and TR for all production levels to find the profit maximizing output of the firm is to employ the technique of marginal analysis (1.5). The profit maximizing level of output occurs where MR = MC.

MR is the revenue obtained by the firm from selling one additional unit of output. When the selling price is given (fixed) MR will equal price.

MC is the cost to the firm of producing one additional unit.

When MR > MC the firm will expand output because each additional unit produced will add more to TR than to TC, and consequently profit will be increased (or loss decreased).

When MR < MC the firm will reduce output because the decrease in revenue will be less than the decrease in cost, and consequently profit will be increased (or loss decreased).

Note: for this condition to hold MC must be increasing.

When the firm reaches an output level at which MR = MC, profit will be maximized since any increase or decrease in output will diminish profit.

Example. The data in Table 3.5.5(1) are derived from the estimates of marginal cost in Table 3.4.9.5(1) and the profit data in Table 3.5.1(1).

Table 3.5.5(1) Marginal Cost and Profit Maximization

Total Product	Total Revenue	Total Cost	Marginal Cost	MR=AR =Price	Profit
0	0	100			-100
1	5	200	100.00	5	-195
10	50	300	11.11	5	-250
36	180	400	3.85	5	-220
80	400	500	2.27	5	-100
130	650	600	2.00	5	50
210	1050	700	1.25	5	350
238	1190	800	3.57	5	390
264	1320	900	3.85	5	420
288	1440	1000	4.17	5	440
310	1550	1100	4.55	5	450
330	1650	1200	5.00	5	450
348	1740	1300	5.56	5	440
364	1820	1400	6.25	5	420
378	1890	1500	7.14	5	390
384	1920	1600	16.67	5	320
384	1920	1700			220

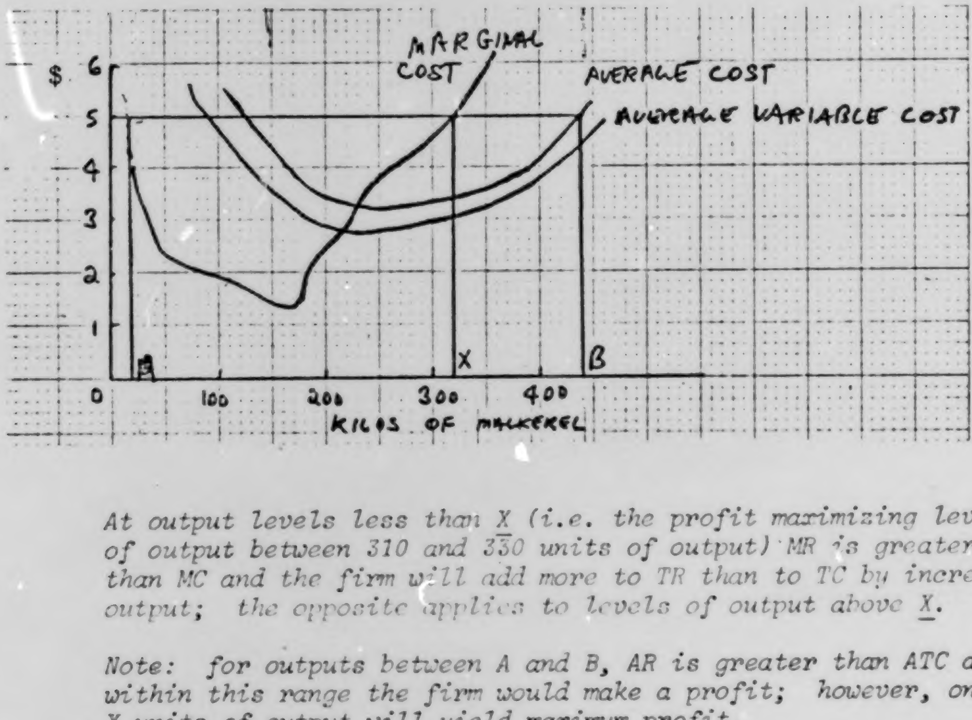
In this case marginal cost equals price, i.e. $5, at the range of output 310 to 330. At this range of output the firm is achieving maximum profit.

Note that the firm could achieve maximum profit of 450 by producing either 310 or 330 units of output, i.e. by hiring either 10 or 11 units of labor (3.4.8). If labor were divisible into very small amounts the profit maximizing level of output would lie between 310 and 330 units of output.

At an output of 364 units the marginal cost is $7.14 and the price is still $5, hence total profit would be increased by reducing output. Similarly, if output were 210 units, additional units of output would add less to cost than $5, up to the point at which MC = MR.

Diagram 3.5.5(1) reproduces the cost data for 3.5.4 and includes the marginal cost curve.

Diagram 3.5.5(1) Marginal Cost and Profit Maximization



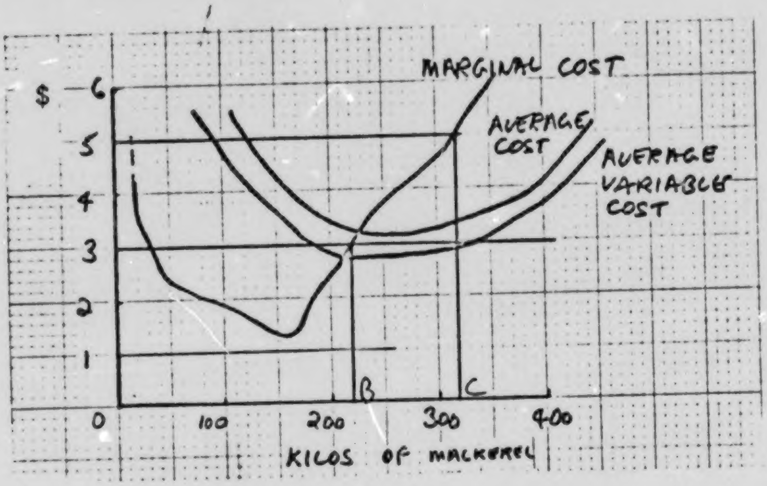
At output levels less than X (i.e. the profit maximizing level of output between 310 and 330 units of output) MR is greater than MC and the firm will add more to TR than to TC by increasing output; the opposite applies to levels of output above X.

Note: for outputs between A and B, AR is greater than ATC and within this range the firm would make a profit; however, only X units of output will yield maximum profit.

3.5.6 Since a profit maximizing firm will produce up to the output at which MR = MC, given that the firm can cover its variable costs, the MC curve of the firm from its point of intersection of the AVC curve (i.e. its minimum point) will be the firm's short run supply curve, i.e. it will indicate the quantities of output a profit maximizing firm will be willing to produce at each price.

Example. *Diagram 3.5.6(1) reproduces Diagram 3.5.5(1) together with the three different prices for mackerel.*

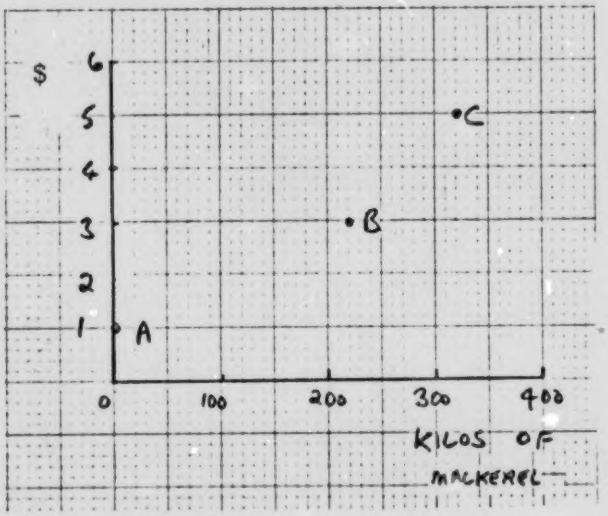
Diagram 3.5.6(1)



At a price of $5 the firm will produce OC kilos of mackerel, at a price of $3 B kilos and at a price of $1 the firm will produce zero (not OA) kilos of mackerel because variable costs can not be covered at that price. Diagram 3.5.6(2) contains these three points on the firm's short run supply curve:

Price	*Quantity*
$5	*C*
$3	*B*
$1	*O*

Diagram 3.5.6(2) Three Points on the Firm's Short Run Supply Curve



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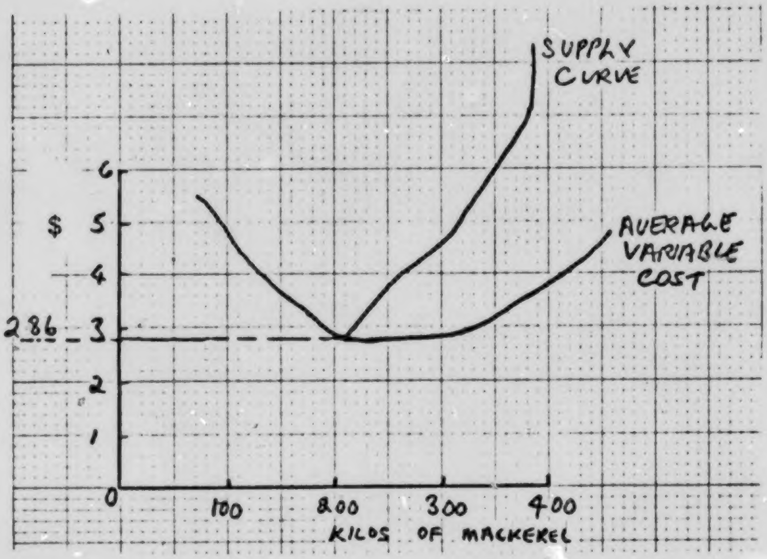
For prices less than $2.86 the firm will supply zero output (the minimum level of AVC). For all prices greater than $2.94 the profit maximizing outputs will be determined by the intersection of each price (MR) line with the MC curve. Thus the firm's short run supply for all prices less than $2.86 will be the vertical axis. For all prices greater than $2.86 the firm's short run supply curve will be the firm's MC curve. Note: the firm's short run supply curve will become a vertical line when the MP_l *is zero, i.e. the firm is unable to produce any additional output in the short run no matter how high the price. Diagram 3.5.6(3) shows the short run supply curve for the fishing boat.*

Diagram 3.5.6(3) The Short Run Supply Curve of the Mackerel Boat



3.5.7 The firm's short run supply curve will shift if the per unit cost of the variable factor of production changes.

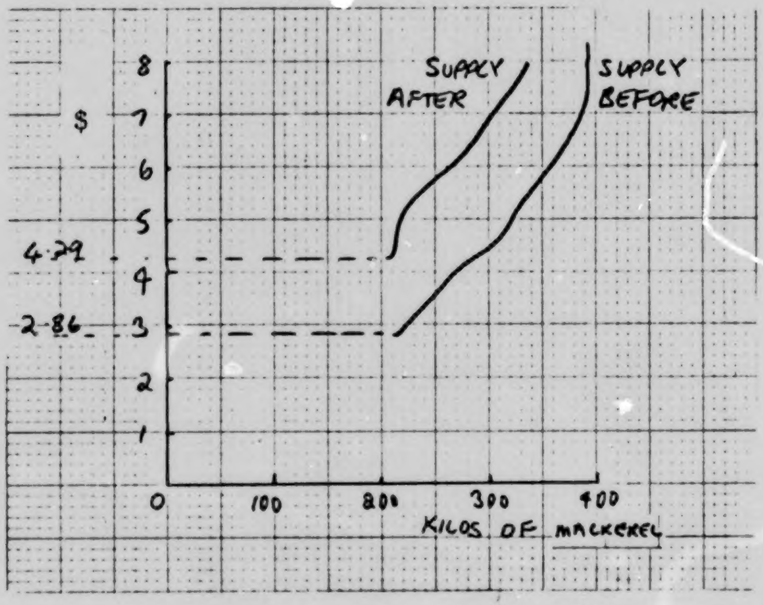
Example. In 3.4.9.5 the marginal cost of production was calculated on the basis of a wage rate of $100 per day. The following data in Table 3.5.7(1) show the effect on marginal cost of an increase in the wage rate (cost of the variable factor) to $150 per day.

Table 3.5.7(1) Change in Wage Rates; Change in Marginal Cost

TP	MP	AVC Before (Wage=$100)	AVC After (wage=$150)	MC Before	MC After
0					
1	1	100.00	150.00	100.00	150.00
10	9	20.00	30.00	11.11	16.67
36	26	3.33	12.50	3.85	5.77
80	44	5.00	7.50	2:27	3.41
130	50	3.85	5.78	2.00	3.00
210	80	2.86	4.29	1.25	1.88
238	28	2.44	4.41	3.57	5.36
264	26	3.03	4.55	3.85	5.78
288	24	3.13	4.70	4.37	6.26
310	22	3.23	4.85	4.55	6.83
330	20	3.33	5.00	5.00	7.50
348	18	3.45	5.18	5.56	8.34
364	16	3.57	5.36	6.25	9.38
378	14	3.70	5.55	7.14	10.71
384	6	3.91	5.87	16.67	25.01
384	0	4.17	6.26		

The effect on the supply curve of the change in wage rates has two distinct aspects. First, the minimum price at which the firm will be prepared to supply more than zero is increased from $2.86 to $4.29, i.e. the minimum AVC has increased. Second, at each price the firm will be willing to supply less than before the increase in wage rates; a price of $7 would have resulted in an output of 364 units before and 310 units after the change. The shift in the supply curve is shown in Diagram 3.5.7(1).

Diagram 3.5.7(1) A Shift in the Supply Curve



Note: changes in productivity of the firm's variable factor of production would cause the supply curve to shift but for this to occur the firm would have to be already producing in an engineering inefficient manner and/or the fixed factor would have to alter. For example, if the mackerel fishing boat moved to a better fishing ground it could not have been producing to maximum efficiency previously, and if superior rods were supplied the fixed factor would have changed.

3.6 Industry Supply in the Short Run

3.6.1 An industry is comprised of a number of firms. The industry supply is the summation of the amount which each firm would be willing to supply at each price, i.e. industry supply is the summation of the supply curves of the firms in the industry.

Example. Suppose mackerel are supplied in a small town by three firms. Captain Joe owns two large modern fishing boats, Captain Harry owns one large modern fishing boat, and Captain Sam owns one small old boat. Table 3.6.1(1) contains data on the amount of mackerel each is willing to produce at different prices, and by summing these quantities the total short run supply of mackerel in the market, i.e. the industry supply.

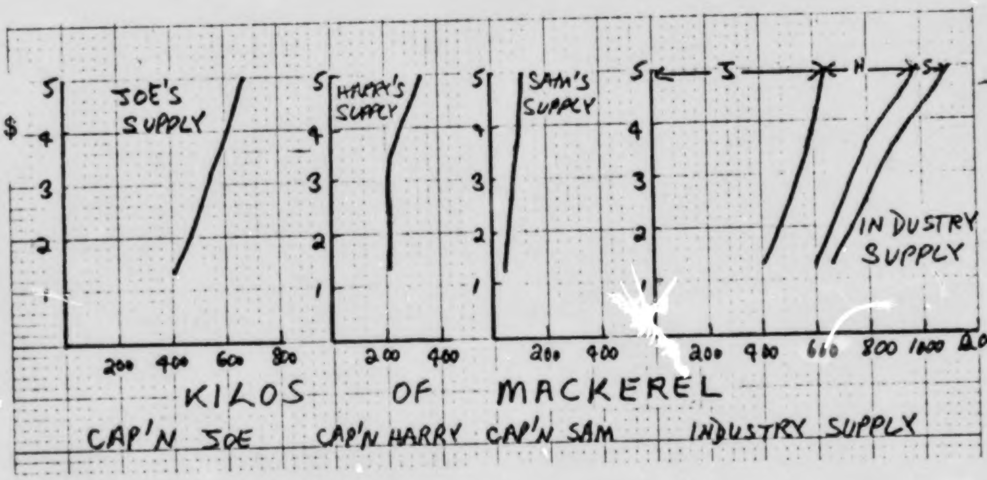
The data for Captain Harry are the data contained in Table 3.5.5(1), and the data for the other two firms have been derived in a similar fashion.

Table 3.6.1(1) The Industry Supply of Mackerel

Price $	Captain Joe's Supply	Captain Harry's Supply	Captain Sam's Supply	Industry Supply
0.00	0	0	0	0
1.25	420	210	40	670
3.57	576	238	86	900
5.00	660	330	110	1100

Each firm pays the same for each unit of labor hired, i.e. the difference in the firms' supply curves are due to differences in the capital (fixed factor) owned. The data for Table 3.6.1(1) are plotted in Diagram 3.6.1(1).

Diagram 3.6.1(1) The Industry Supply Curve for Mackerel

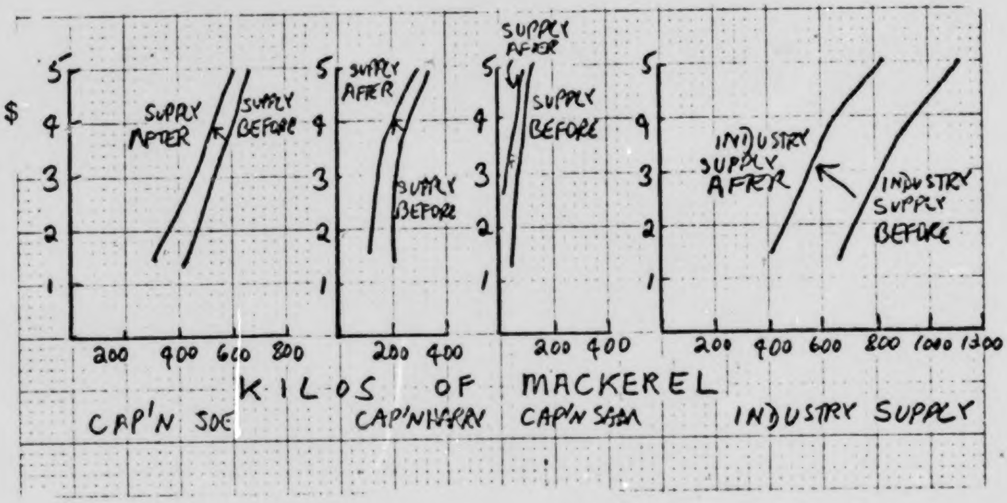


Each firm's short run supply curve is its MC curve above the intersection point with its AVC curve and the industry supply is the summation of the individual firm's supply curves.

3.6.2 A change in the price of the variable factor input will shift each firm's supply curve and consequently the supply curve for the industry.

Example. A large construction firm moves into the town and by offering higher rates of pay than the fishing industry forces the owners of fishing boats to increase their wages by 50% in order to keep their crews. It was shown in 3.5.7 how such an increase in the price of the variable factor resulted in a shift of the supply curve of Captain Harry's fishing boat (firm). Since Captains Joe and Sam hire labor in the same market the increase in labor costs will cause their supply curves to shift in the same direction, i.e. to the left. Diagram 3.6.2(1) shows each firm's supply curves and the industry supply curve before (3.6.1(1)) and after the increase in labor costs.

Diagram 3.6.2(1) Shift in the Supply Curves of the Firms and Industry



3.7 Firm Supply in the Long Run

3.7.1 In the theory of supply in the short run it is assumed (3.3.6) that the firm operates in a time period in which one factor (capital) is fixed and one factor (labor) is variable. In the long run all factors are variable, i.e. assumption 3.3.6 is relaxed, and the firm seeks the profit maximizing output by varying both capital and labor.

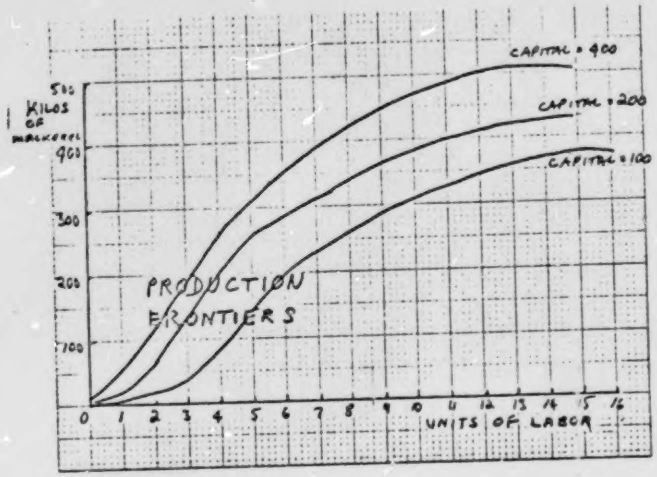
Example. The fishing boat firm may be considering how to increase output after hiring 15 men on the one mackerel boat already owned. The only way to do so is to buy another boat, since hiring another unit of labor will not increase output (3.4.2). The decision which the firm must make in the long run, i.e. when an addition to capital is made by buying another boat, is similar to that in the short run: will an increase in capital add more to revenues than to costs? If it does not then the profit maximizing firm will not increase its capital.

3.7.2 When a firm makes a long run decision it changes the amount of capital hired. Once the capital has been hired the firm is once again in the short run, in which capital (new plus old capital) is fixed and the quantity of labor hired (variable factor) can be varied.

Example. When Captain Harry is considering adding to his fleet of fishing boats he is contemplating a long run decision. However, once he has bought an additional boat he is in a short run decision making period and the amount of fish he will be willing to produce (and the number of men he will hire) will be determined by the price of fish and his new marginal cost curve, i.e. his new short run supply curve.

Diagram 3.4.2(1) shows the production frontier for a fixed input of $100 and variations in labor input. It can be assumed that the addition of one fishing boat to Captain Harry's fleet adds $100 to the fixed cost, and the addition of a modern and much more sophisticated boat will add a further $200 to the fixed cost. With each of these two higher levels of fixed cost a production frontier can be traced which will follow the pattern of the original production frontier. This is shown in Diagram 3.7.2.

Diagram 3.7.2 (1) Production Frontiers and Different Amounts of Capital

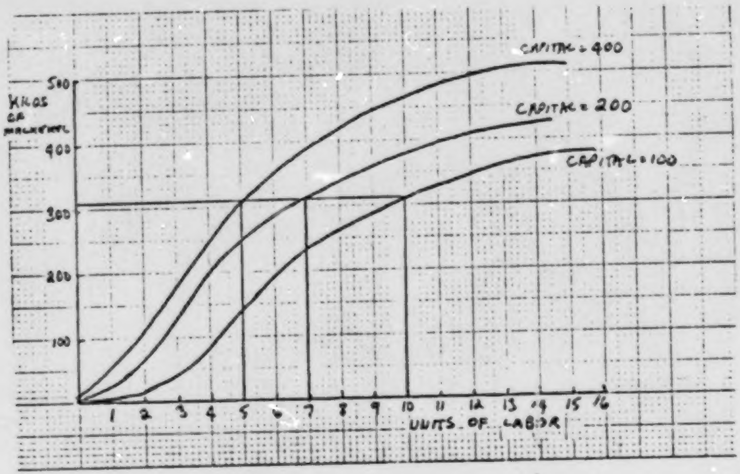


Note that the productivity curves associated with the higher amounts of fixed factor may join the original production frontier at lower levels of output (3.4.3) and for smaller quantities of labor hired. In subsequent diagrams it will be assumed that the curves remain distinct back to the origin.

3.7.3 Since, in the long run, a firm can vary the amounts it hires of both capital and labor, there will be an infinite number of possible combinations of units of capital and labor capable of producing a given level of output. Consequently, there will be an infinite number of different costs associated with a given level of output. These costs will be determined by the number of units of capital employed and the price of a unit of capital, together with the number of units of labor employed for each production frontier together with the price per unit of labour.

Example. The fishing boat firm could produce 310 kilos of mackerel by hiring different amounts of labor in conjunction with the different numbers of boats, as shown in Diagram 3.7.3(1).

Diagram 3.7.3(1) Different Ways of Catching 310 Kilos of Mackerel



This would result in three different costs as shown in Table 3.7.3(1).

Table 3.7.3(1) Different Costs of Catching 310 Kilos of Mackerel

Fixed Cost	Labor	Cost per unit of labor	Labor Cost	Total Cost
100	10	100	1000	1100
200	7	100	700	900
300	5	100	500	800

Note: these costs presume that, at each scale of operations, the firm is operating on the production frontier. If this were not the case, then even higher fixed inputs could be associated with the same number of units of labor to give 310 kilos of mackerel.

3.7.4 For any given level of output there will be a unique combination of capital and labor which will yield minimum costs. The minimum costs will be comprised of fixed costs + variable costs. For any other level of output minimum costs will again be comprised of fixed costs + variable costs but for no two levels of output will the same fixed cost yield minimum cost, i.e. the amount of fixed capital which yields minimum cost for one level of output will not yield minimum costs for any other level of output.

Example/

Note: complete divisibility of the fixed factor is assumed. Were capital indivisible, i.e. it could only be varied by relatively large amounts, "level of output" would require to be substituted by "range of output".

Example. In Table 3.7.3 it was shown that the minimum cost method of catching 310 kilos of mackerel was to use the largest amount of capital of the three methods available, and 5 units of labor. However, to catch 264 kilos the costs shown in Table 3.7.4 would be incurred:

Table 3.7.4 Different Costs of Catching 264 Kilos of Mackerel

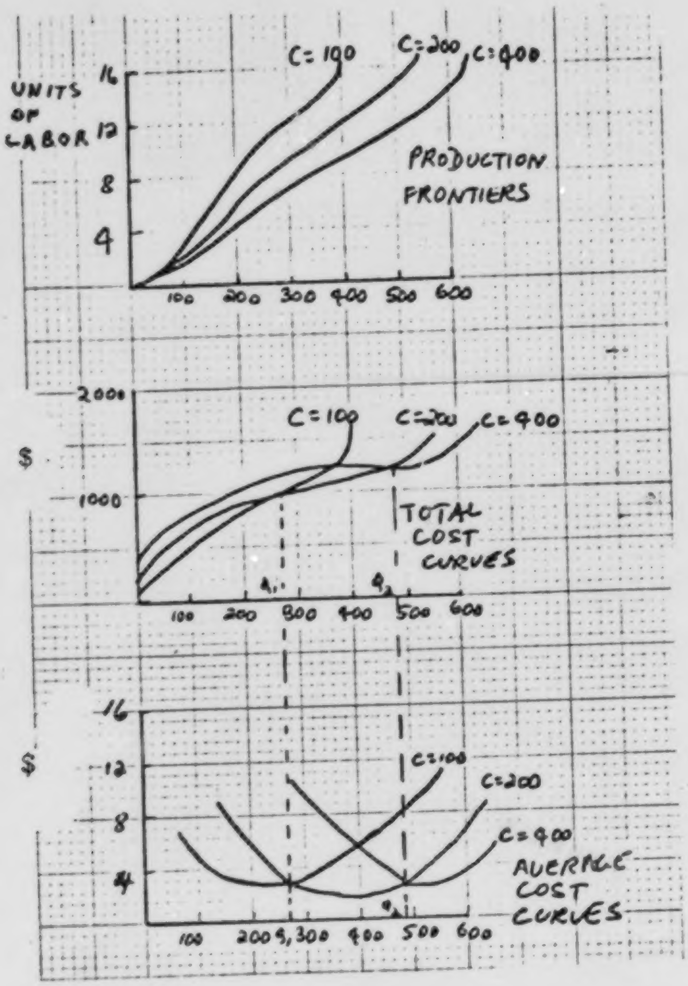
Fixed Cost	Units of labor	Cost per unit of labor	Labor Cost	Total Cost
100	8	$ 100	800	900
200	5	$ 100	500	700
400	4	$ 100	400	800

The highest fixed cost input, i.e. using three boats, is no longer the least cost method of catching mackerel. Hence the owner of the fishing boat firm must have some expectation of how much can be sold prior to deciding on the size of the fixed factor of production.

3.7.5 The long run average cost schedule (curve) for a firm will be the schedule (curve) of minimum average total costs associated with each level of output, i.e. it will be composed of points on short run average cost curves. For any output level no point on a short run average cost curve can lie below the point on the long run average cost curve. The long run average cost curve, often called the envelope curve, is assumed to be U shaped, i.e. to follow the same general pattern as the short run average cost curves.

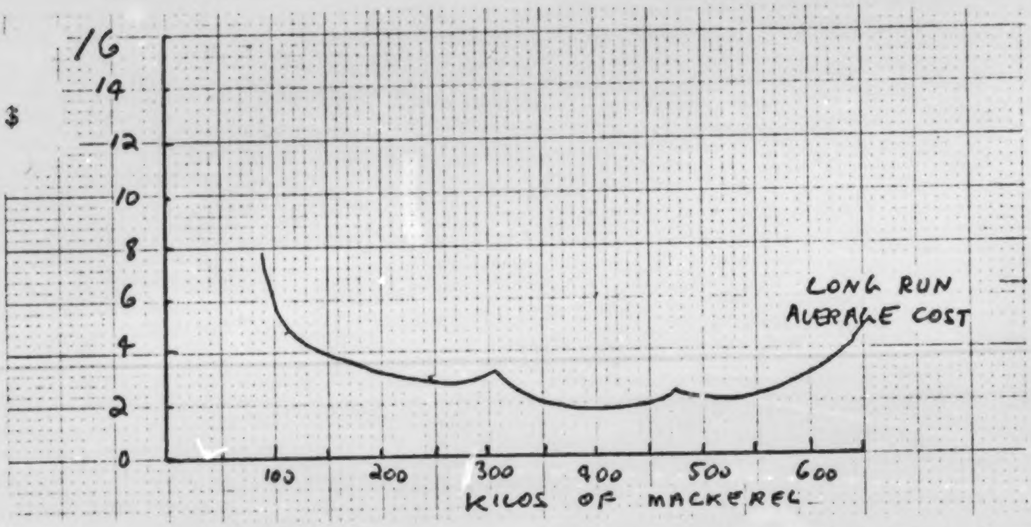
Example. Diagram 3.7.5(1) shows the production frontiers, total cost and average cost curves for the three sizes of fishing boat firm, illustrating that there are ranges of output within which one level of capital input results in lower costs than the other levels of capital input.

Diagram 3.7.5(1) Cost Curves for Different Capital Inputs



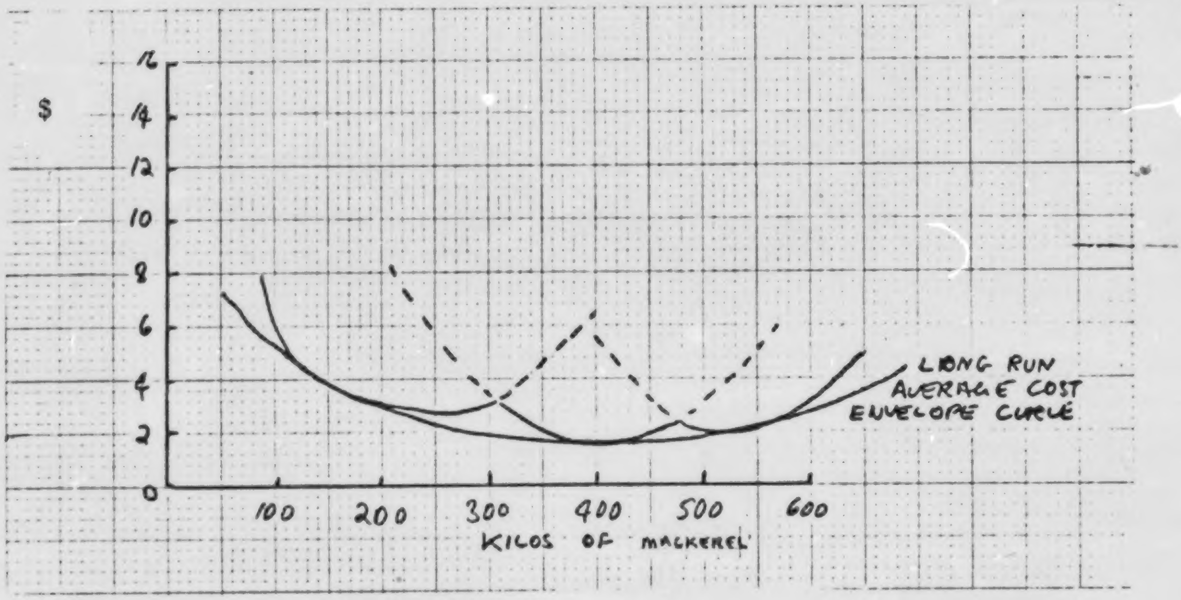
The lowest portion of each short run average cost curve comprises the long run average cost curve as shown in Diagram 3.7.5(2).

Diagram 3.7.5(2) The Long Run Average Cost of Catching Mackerel



If the size of the fishing boat could be varied by infinitesimally small amounts a smooth envelope curve could be drawn which was comprised of the lowest points of a large number of such short run average cost curves and which would have the following form:

Diagram 3.7.5(3) The Envelope Curve: the Long Run Average Cost of Catching Mackerel



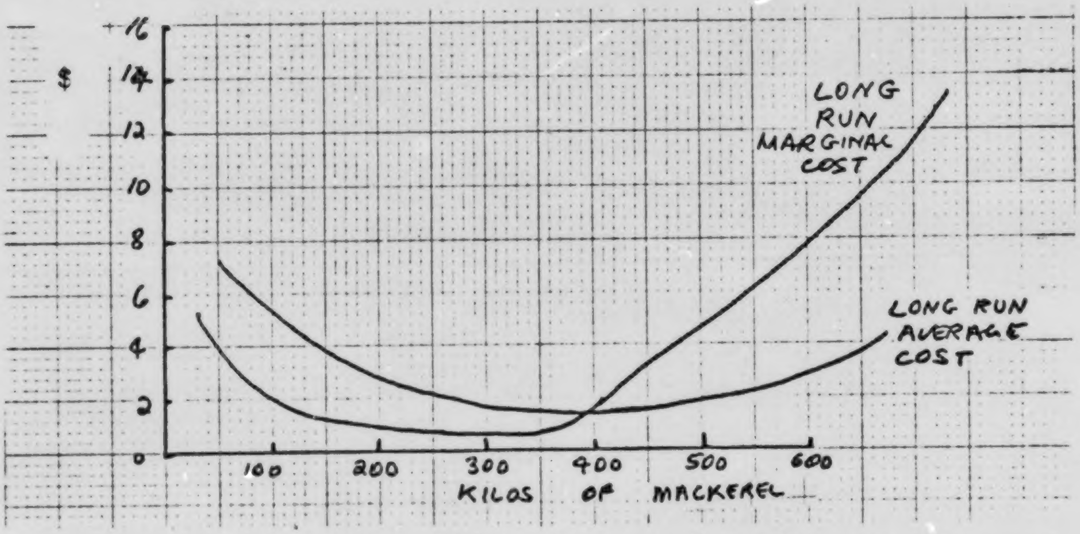
In the diagram is included the three short run average cost curves of Diagram 3.7.5(2), and each of these touches the envelope curve at one point only, i.e. if capital is divisible the long run average cost curve is smooth.

3.7.6 The long run marginal cost is the cost of producing an additional unit of output when all factor inputs are variable. The properties of the firm's long run marginal cost curve are comparable to the firm's short run marginal cost curve.

SRMC	LRMC
dC/dQ (capital fixed)	dC/dQ (no factor fixed)
passes through minimum of AVC, ATC	passes through minimum of LAC
is firm's short run supply curve	is firm's long run supply curve

Example. Diagram 3.7.6(1) contains the long run average cost curve shown in Diagram 3.7.5(3) together with the long run marginal cost curve of the firm.

Diagram 3.7.6(1) Long Run Marginal Cost



3.7.7 The firm will maximize profits in the long run by producing up to the point at which the additional revenue from selling one additional unit of output just equals the additional costs incurred in producing that unit. Since the additional revenue from selling an additional unit equals the price of that unit and additional costs equal LRMC, the profit maximizing rule is:

P = LRMC

Profit maximization in the short run requires that:

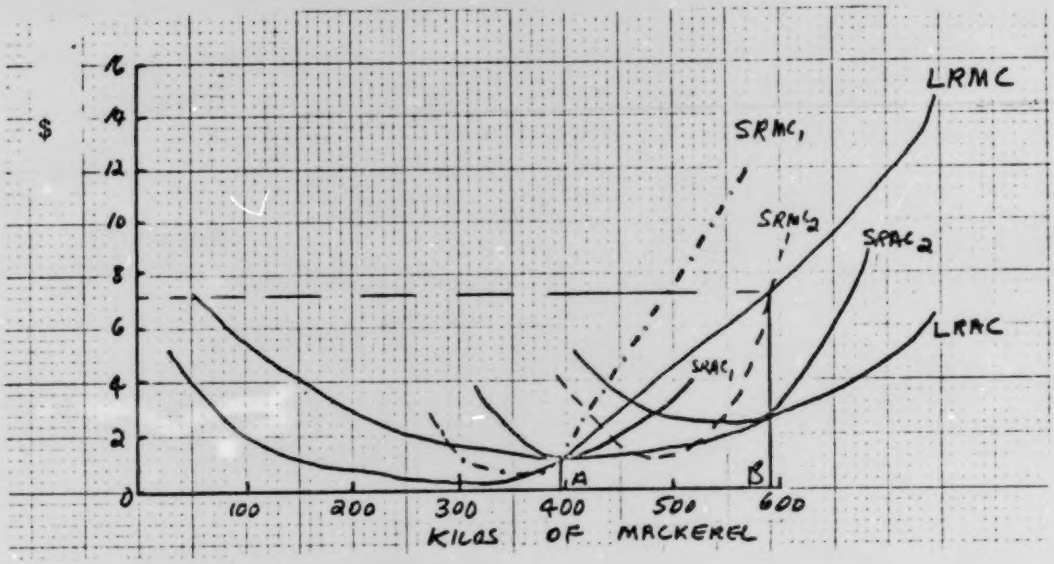
P = SRMC

therefore for the firm to be in long run equilibrium

P = LRMC = SRMC

Example. Diagram 3.7.7(1) combines Diagram 3.7.6(1) and Diagram 3.7.5(3) to show the long run equilibrium of the firm at a price of \$5 per kilo of mackerel.

Diagram 3.7.7(1) The Long Run Equilibrium of the Firm



The SRMC$_1$ and LRMC are equal at the lowest level of LRAC, which is also the point of equality with SRAC$_1$. At \$5 the long run supply curve indicates an output of OB, and at this output LRMC = SRMC$_2$, and LRAC = LRAC$_2$. Thus at a price of \$5 per kilo, the profit maximizing fishing firm will use capital = \$400 and produce OB kilos of mackerel.

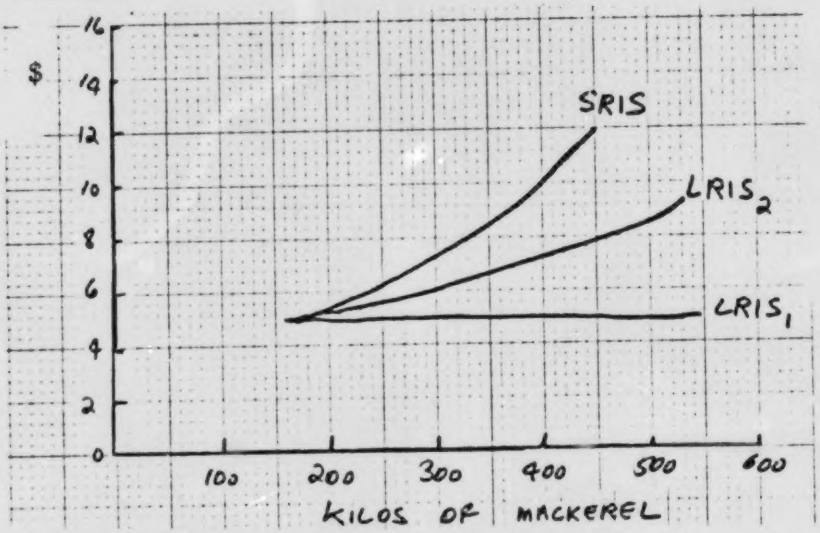
3.8 Industry Supply in the Long Run

3.8.1 While the short run industry supply curve of an industry is obtained by summing the short run supply curves of the individual firms within that industry (3.6.1), the long run supply curve of the industry cannot be found by summing the long run supply curves of the individual firms in the industry. This is because in the long run firms will move into or out of the industry. If costs rise as firms enter the industry the LR industry supply curve will rise; if costs are unaffected by firms entering the industry the long run industry supply curve will be a horizontal line.

Example. If Captain Harry were to order an additional two fishing boats there would be no discernible effect on the costs of building fishing boats. However, if the whole Pacific coast mackerel fleet decided to double in size there would be a considerable effect on costs in the fishing boat building industry.

Diagram 3.8.1(1) shows the possible shapes of the long run industry supply curve of mackerel compared to the short run industry supply curve (3.6.1).

Diagram 3.8.1(1) The Long Run Industry Supply Curve for Mackerel



$LRIS_1$ shows that in the long run there will be an unlimited supply at the price of $5. If the effect of new firms entering the industry were to increase costs a long run supply such as $LRIS_2$ would result.

3.9 Characteristics of Supply

3.9.1 The shape of the total product of the variable factor input curve determines the shape of the short run TC and SRAC curves but does not determine the shape of the long run AC or LRMC curves.

The concept of increasing, constant and diminishing returns refers to the change in output resulting from changes in the variable factor only:

increasing returns occur when $\Delta Q/Q > \Delta L/L$

constant returns occur when $\Delta Q/Q = \Delta L/L$

diminishing returns occur when $\Delta Q/Q < \Delta L/L$

Returns to scale refer to the change in output resulting from changes in all factors of production:

increasing returns to scale occur when $\Delta Q/Q > \frac{\Delta (L,C)}{(L,C)}$

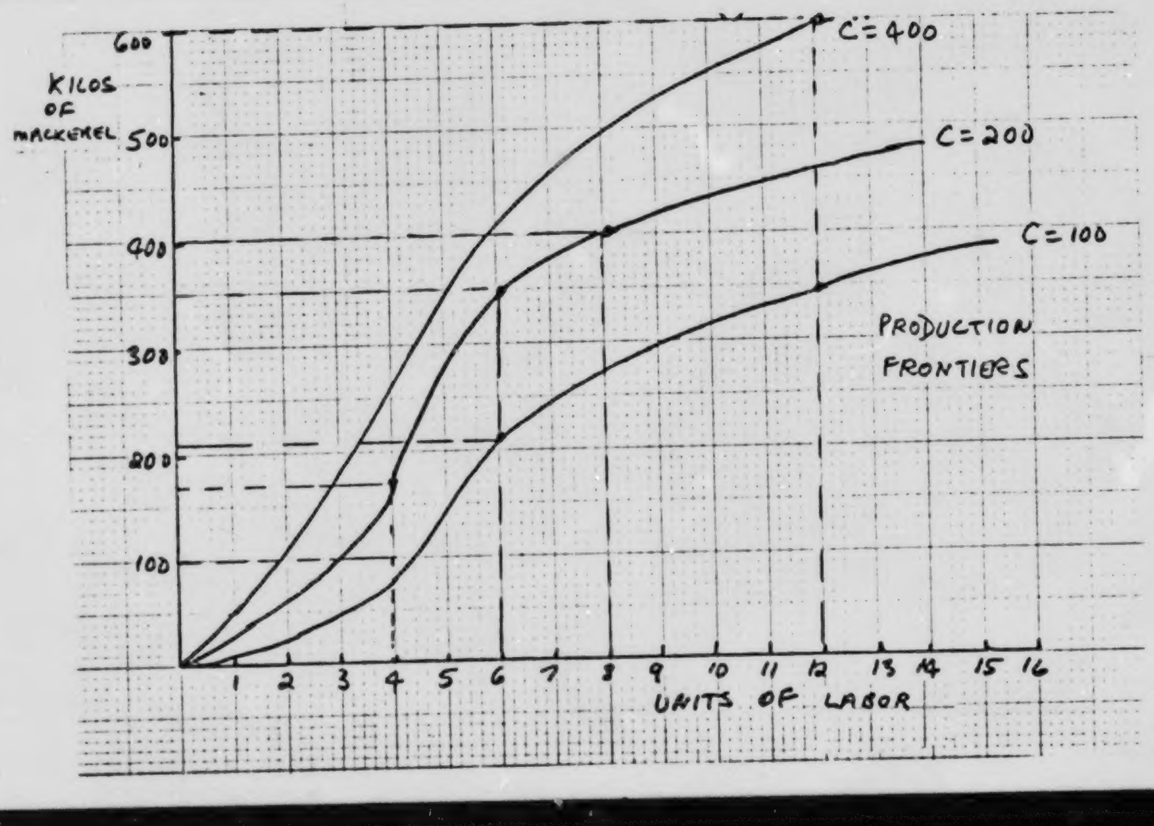
constant returns to scale occur when $\Delta Q/Q = \frac{(L,C)}{(L,C)}$

diminishing returns to scale occur when $\Delta Q/Q < \frac{\Delta (L,C)}{(L,C)}$

Note: no relationship exists between returns to factors of production and returns to scale.

Example. In Diagram 3.9.1(1) the production frontiers for the three levels of capital input are shown together with the effects of varying the labor input on its own and both inputs together.

Diagram 3.9.1(1) Increasing Constant and Diminishing Returns Together with Returns to Scale



With a capital input of \$100, a doubling of the labour (variable factor input) from 6 to 12 (i.e. a 100% increase) results in an increase in output from 210 to 348 kilos of mackerel (an increase of 66%); thus over this range of output there are diminishing returns to the variable factor. With a fixed factor input of \$200 a doubling of the variable factor input from 4 units of labor to 8 units of labor increases the output from 160 kilos to 400 kilos, an increase of 150% over this range of output, i.e. increasing factor returns.

A doubling of both factor inputs from capital input = \$100 to \$200 and labor input 4 to 8 units increases output from 80 to 400 kilos, i.e. there is increasing returns to scale. A doubling of the inputs from capital = \$200 and labor = 6 to capital = \$400 and labor = 12 results in an increase in output from 350 to 600 kilos, i.e. there are diminishing returns to scale.

3.9.2 In the short run firms in the industry will adjust their output as price changes according to their individual supply curves (3.5.6). These price changes will lead to a movement along the industry supply curve (3.6.1).

In the long run firms within the industry will change both fixed and variable inputs as price changes to achieve long run equilibrium (3.7.7) and firms will enter or leave the industry resulting in a movement along the long run industry supply curve (3.8.1).

It is useful to have a measure of the responsiveness of quantity of output supplied to change in price; elasticity of supply is defined as: $\frac{Q}{Q} \quad \frac{P}{P}$. This measure is subject to the same qualifications as the measure of elasticity of demand (2.7). Two cases are distinguished: elastic and inelastic supply.

3.9.2.1 Elastic supply: when a proportionate increase (decrease) in price produces a more than proportionate increase (decrease) in supply.

Example. In the fishing industry example of 3.6.1, at low levels of output a relatively small increase in the price of fish will result in a more than proportional increase in the quantity of fish caught since with the fixed factors it is possible to hire additional units of labor whose marginal product is relatively high.

3.9.2.2 Inelastic supply: when a proportionate increase (decrease) in price produces a less than proportionate increase (decrease) in supply.

Example. At higher levels of output in the fishing example, an increase in the price of mackerel will have a proportionately smaller effect on the amount of fish caught because the smaller boats will be unable to increase output in the short run no matter if additional units of labor are hired.

3.9.3 The long run elasticity of supply will normally be greater than the short run elasticity of supply because firms in the industry are able to increase or reduce their use of fixed factors or move out of or into the industry in response to price changes.

Example. In Diagram 3.8.1(1) the LRIS curve was drawn between the SRIS curve and the horizontal $LRIS_1$ *curve, i.e., a supply curve of infinite elasticity. Because of the effect on industry supply of firms moving in and out of the industry it is not possible to estimate the long run elasticity of supply from the information available on the firms currently in the industry.*

MICRO UNIT 4

PRICE AND OUTPUT DETERMINATION IN MARKETS

4.1 The Concept of a Market
4.2 Market Supply and Demand
4.3 The Operation of Markets
4.4 Changes in Market Equilibrium
4.5 Intervention in the Market
4.6 Dynamic Adjustments in the Market

4.1 The Concept of a Market

4.1.1 A market is formed when individuals with demands for a good, i.e. potential buyers, are in communication with individuals willing to supply that good, i.e. potential sellers.

> *Example. There is a market for Rose Bowl tickets even after they have all been allocated, if some students are prepared to buy tickets for the football game and other individuals who possess tickets are willing to sell them.*

4.1.2 The geographical dimensions of markets vary considerably. Markets may be highly localized (the limiting case being one potential buyer and one potential seller) or they may be international, involving buyers and sellers in different countries.

> *Example. There is a market for houses and apartments in each small town in Mississippi and in each large city in California. Each of these is a local market. In contrast, many basic materials and commodities such as coffee, cocoa, sugar, shipping, copper, zinc and steel are bought and sold internationally by dealers from many countries.*

4.1.3 Markets exist not only for goods and services but also for resources.

> *Example. In the U.S. there is a market for computer programmers which consists of all those people with qualifications and/or experience in programming who wish to be employed as programmers, and all those organizations, e.g. universities, corporations, banks, etc., which wish to hire computer programmers.*

4.1.4 In a market in which exchange takes place, the competition among buyers (explicit or implicit) to buy a good and the competition among sellers (explicit or implicit) to sell that good produces a price (prices) for the good, at which quantities of the good are bought and sold.

> *Example. In the annual Scottish Highland Show cattle dealers from many countries come together to bid against each other in the market to purchase top Aberdeen Angus bulls. Scottish farmers compete with each other to sell those bulls. It is the competition among buyers and also among sellers which determines both the price of Aberdeen Angus bulls and the quantity bought and sold. Because the buyers and sellers are in direct communication with each other the competition is explicit. But in a similar way implicit competition exists among/*

among suppliers of automobiles offered for sale through major dealers and implicit competition also exists among individuals who wish to buy automobiles. A potential buyer of a Ford Mustang may not come into contact with other potential buyers but nevertheless competition exists between them. Similarly, two large Ford dealers on opposite sides of a major city may not directly observe each other's behavior in the same way as do potential sellers at the Highland Show but they still compete with each other to sell Ford Mustangs to potential buyers.

4.1.5 Market prices provide information to buyers attempting to maximize utility from the allocation of their budgets on a variety of goods and services, and also to suppliers attempting to maximize profits from the production and sale of a variety of goods and services.

Example. In the Scottish Highland Show each individual cattle dealer knows what price he is prepared to pay for Aberdeen Angus bulls (i.e. his demand schedule) but it is the market which provides information about the prices at which exchange actually takes place. Similarly, while each farmer knows the price at which he would be willing to sell bulls (i.e. his supply schedule) it is the market which indicates to all farmers the prices at which exchange actually takes place.

4.1.6 While the decisions of suppliers determine which resources are employed and consequently which goods and services are produced and also how much of each good and service is produced, economic efficiency requires that resources are allocated to the production of those goods and services which satisfy society's wants as fully as possible. Prices indicate to suppliers society's preferences for different goods and services, and it is to prices that suppliers respond in the decision making process. Consequently prices determine how resources are allocated.

Example. Following the Middle East crisis in the early 1970s, significant rises in the price of oil relative to other goods changed the pattern of resource allocation in the automobile industry. Journeys by private automobile became relatively more expensive than other forms of transport, and potential new car buyers' tastes moved in favor of smaller cars with lower gasoline consumption. As a result, automobile firms changed production plans to increase the output of compact cars, and in turn this led to changes in the quantity of labor and also the amount and type of capital equipment used in automobile production as these firms, seeking to maximize profits, geared their assembly lines towards producing compact cars.

4.1.7 In a market economy a system of interrelated markets for goods, services/

services and resources determines how resources are allocated and operates without any centralized planning mechanism or central decision making body.

> *Example. In the U.S., millions of households buy quantities of food and drink every day, including bread, cheese, meat, milk, coffee, cans of fruit, fresh fruit, butter, margarine, fish, etc. Retail outlets of every size, from small corner grocery stores to giant supermarkets, regularly estimate how much of each kind of food and drink they will sell, and in turn place orders with suppliers. These suppliers base production plans for food and drink on the basis of estimated consumer demand and therefore allocate resources to the supply of various kinds of food and drink accordingly.*
>
> *The relative quantities of food and drink bought by households are not decided by some central plan, nor are the resources allocated to the production of food and drink decided by a planning mechanism. Instead the pattern of resource allocation is the outcome of millions of independent households expressing their preferences for various kinds of food and drink in markets, and the decisions of many independent suppliers to hire resources in order to satisfy consumer preferences by producing the goods they desire.*

4.2 Market Supply and Demand

4.2.1 A market demand curve relates the quantities of a good individuals would be prepared to buy at different prices; a market supply curve relates the quantities of a good supplies would be prepared to sell at different prices. A necessary condition for exchange to take place in a market is that there must be at least one common price at which suppliers would be prepared to sell a quantity of the good and at which individuals would be prepared to buy a quantity of the good.

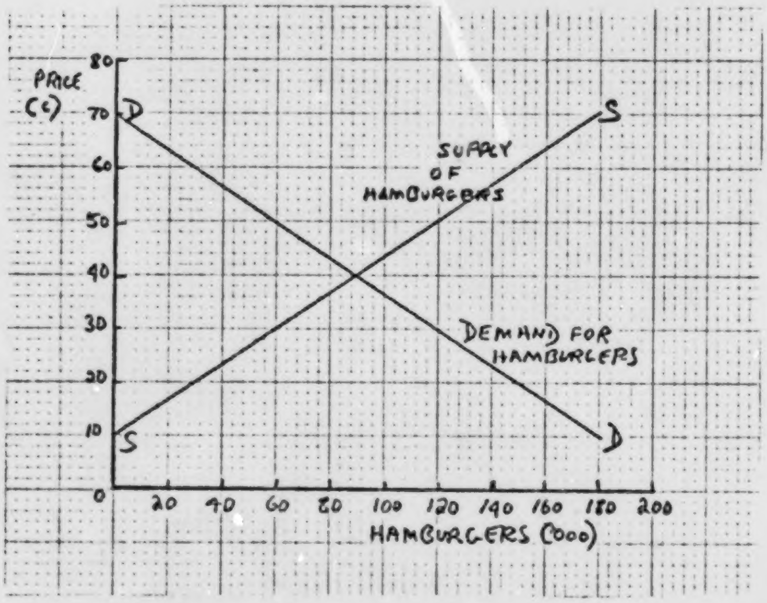
Example. Table 4.2.1(1) contains data relating to hypothetical demand and supply schedules for hamburgers in a U.S. city.

Table 4.2.1(1) Market Demand and Supply Schedules for Hamburgers in a U.S. city

Price	Quantity Demanded ('000 per week)	Quantity Supplied ('000 per week)
10c	180	0
20c	150	30
30c	120	60
40c	90	90
50c	60	120
60c	30	150
70c	0	180

These data are expressed diagrammatically in Diagram 4.2.1(1).

Diagram 4.2.1(1) Market Demand and Supply Curves for Hamburgers in a US City



Exchange could take place in this market at any price above 10c. and below 70c. This is because at least one consumer would be prepared to buy a hamburger and at least one supplier would be prepared to sell a hamburger at all prices within this range. Exchange would be possible at a price of 60c., for example, since consumers would be prepared to buy 30,000 hamburgers per week and firms would be willing to supply 150,000 hamburgers per week. At a price of 20c. exchange would also be possible since consumers would be willing to buy *150,000 hamburgers per week and suppliers would be willing to sell 30,000 hamburgers per week at that price. It would not be possible, however, for exchange to take place at 10c., because although individuals would be willing to buy 180,000 hamburgers per week at that price, no firms would be prepared to supply hamburgers at 10c. each. Similarly, exchange could not take place at 70c. because no individuals would be willing to buy hamburgers at that price, although firms would be prepared to supply 180,000 hamburgers per week at that price.*

4.2.2 The reason that exchange takes place in a market is that both buyers and sellers benefit. Assuming rational behavior, any consumer who is prepared to buy a unit of a good at a certain price must prefer that good to cash, otherwise there would be no incentive for him to sacrifice cash in order to acquire the good. Similarly, any producer who is prepared to supply a unit of a good at a certain price must prefer cash to the good, otherwise there would be no incentive for him to participate in exchange.

Example. In the market for hamburgers illustrated in 4.2.1, consumers would be prepared to buy 120,000 hamburgers at a price of 30c., and at that price producers would be willing to supply 60,000 hamburgers. Both consumers and producers would gain through exchange. Consumers who wish to buy hamburgers at 30c. would gain more satisfaction from a hamburger than from 30c. Producers who would be prepared to sell hamburgers at 30c. would prefer the 30c. received from the sale of each hamburger to the hamburgers themselves.

4.2.3 Even where a market demand schedule for, and a market supply schedule of a good exist, exchange would be impossible if there were no common price at which at least one consumer was prepared to buy a unit of the good and at least one producer was willing to supply a unit of the good.

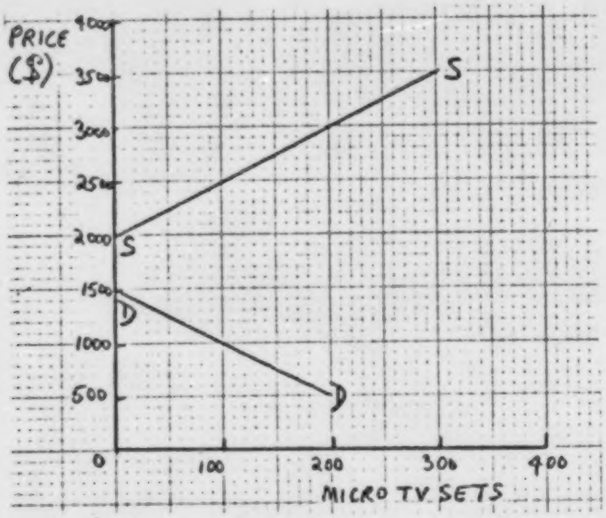
Example. Suppose the electronics industry developed a new micro-television set with a one inch square screen to be worn on the wrist, and suppose that the market demand and supply schedules are as shown in Table 4.2.3(1).

Table 4.2.3(1) Market Demand and Supply Schedules for Micro TV Sets

Price ($)	Quantity Demanded (per week)	Quantity Supplied (per week)
500	200	0
1000	100	0
1500	0	0
2000	0	0
2500	0	100
3000	0	200
3500	0	300

Exchange would not be possible in this market because there is no common price at which consumers and producers would be prepared to buy and sell the micro TV sets. Consumers would be willing to buy certain quantities of these sets at prices of $1000 and below. In contrast, producers would only be prepared to supply the TV sets at prices of $2500 and above. As shown in Diagram 4.2.3(1) there is no price at which exchange would occur.

Diagram 4.2.3(1) Market Demand and Supply Curves for Micro TV Sets

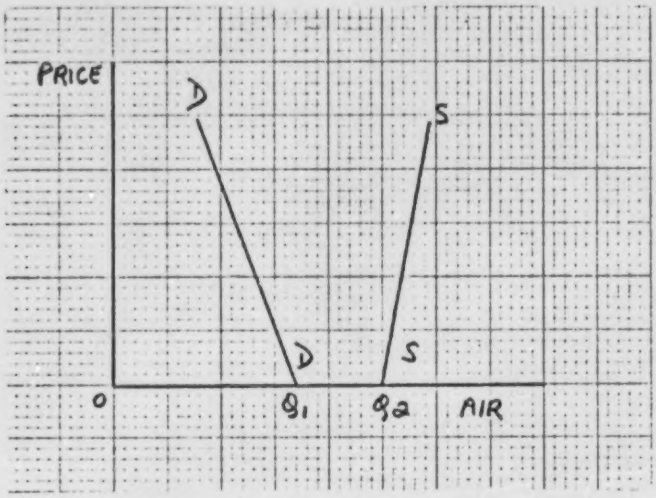


4.2.4 If at all positive prices in a market the quantity of a good supplied exceeds the quantity demanded, the price of the good will be zero. When such market circumstances occur, the good is referred to as a "free" good.

Example. Goods such as fresh air are often classified as free goods when consumers can have as much of them as they want/

want without having to pay for them. As shown in Diagram 4.2.4(1) the market for air in the Scottish Highlands may be represented by the supply curve SS, and the demand curve by DD.

Diagram 4.2.4(1) Demand for and Supply of Air in the Scottish Highlands



The supply curve slopes upwards because at various positive prices, individuals would be prepared to supply different quantities of air, e.g. in the form of air conditioning.

The quantity of air available at a price of zero is OQ_2. The largest quantity of air people desire is OQ_1 at a price of zero. Thus at a price of zero the quantity supplied exceeds the quantity demanded.

Given these demand and supply schedules, a zero price for air would exist in the market because, at that price, people can have as much air as they want. Goods, however, such as air and water, which are traditionally regarded as free, may have particular markets in which exchange at a positive price can take place. In Los Angeles, for example, fresh air is not always a free good but it can be available through air conditioning. The market for air conditioning would be represented by a diagram similar to the hamburger market diagram of 4.2.1. As shown in Diagram 4.2.4(2) consumers would be willing to buy different quantities of air conditioning systems at different prices and in which producers would be prepared to supply different quantities of air conditioning systems at different prices. In the air conditioning market there would be a range of prices at which exchange could take place.

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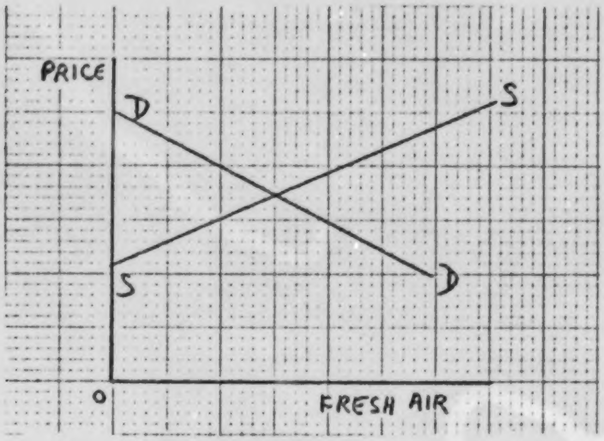
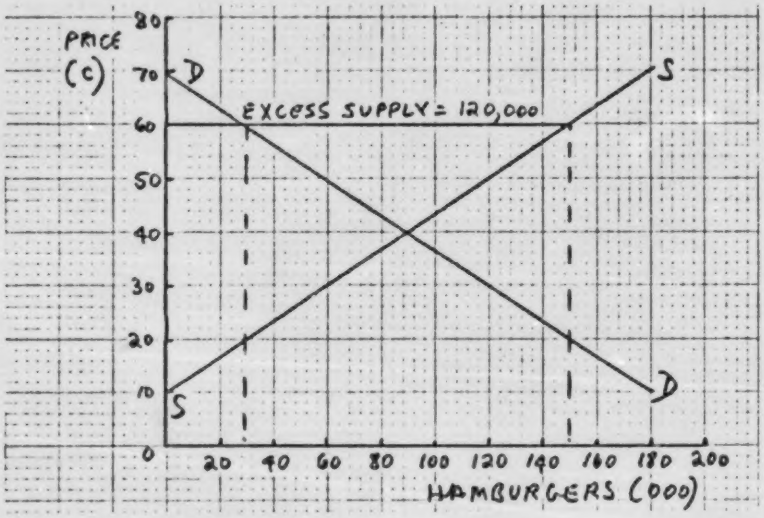
Diagram 4.2.4(2) Market Demand and Supply Curves for Air Conditioning



4.2.5 Excess supply exists in a market when, at a given price, the quantity of a good firms are prepared to supply exceeds the quantity consumers are prepared to buy.

Example. Diagram 4.2.5(1) illustrates a situation of excess supply in the market for hamburgers.

Diagram 4.2.5(1) Excess Supply in a Market



At a price of 60c. hamburger suppliers would be willing to sell 150,000 hamburgers per week whereas consumers would be willing to buy only 30,000 hamburgers per week. Therefore at a price of 60c. excess supply of 120,000 hamburgers per week would exist.

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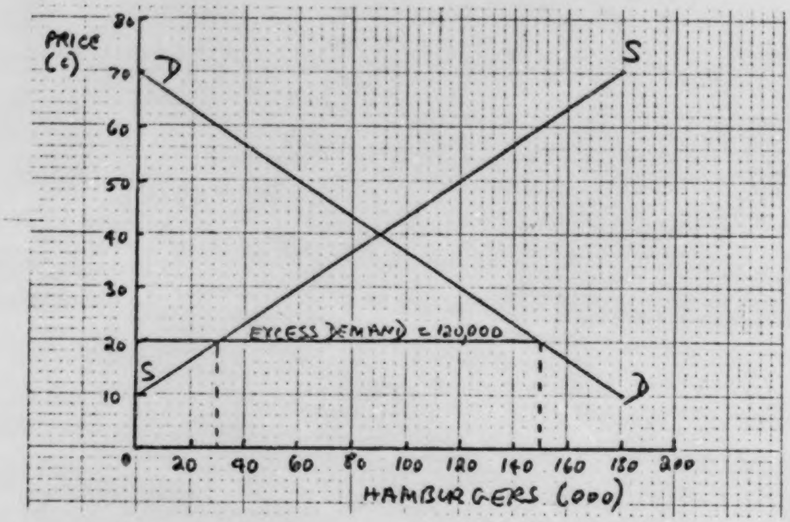
4.2.6 Excess demand exists in a market when, at a given price, the quantity of a good consumers are prepared to buy exceeds the quantity firms are prepared to supply.

Example. Diagram 4.2.6(1) illustrates a situation of excess demand in the market for hamburgers.

Diagram 4.2.6(1) Excess Demand in a Market

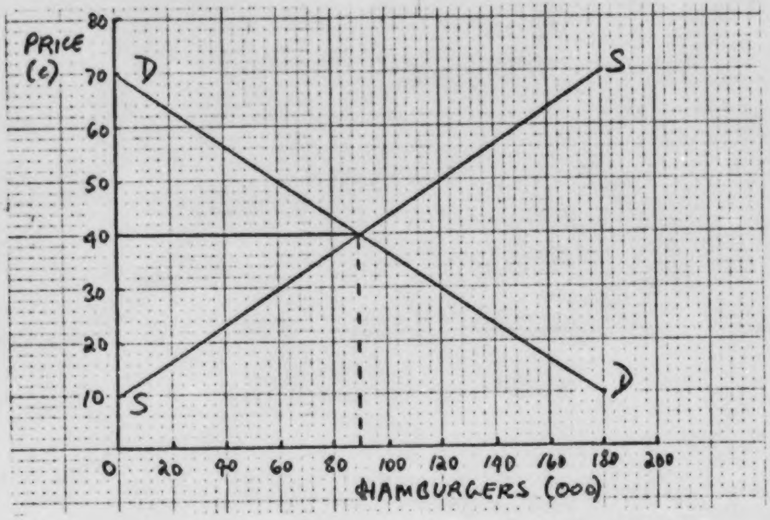


At a price of 20c. consumers would wish to buy 150,000 hamburgers per week, but suppliers would be willing to sell only 30,000 hamburgers per week at that price. Hence excess demand of 120,000 hamburgers per week would exist if the price were 30c.

4.2.7 At the unique price in a market at which the quantity of a good consumers are willing to buy equals the quantity of the good firms are willing to sell, neither excess demand nor excess supply exists. All individuals who are willing to buy as much of the good as they want at that price are able to do so, and all firms who are willing to sell as much of the good as they wish at that price are able to do so.

Example. Diagram 4.2.7(1) illustrates the price in the market for hamburgers at which neither excess demand nor excess supply exists.

Diagram 4.2.7(1) Hamburger Market with Neither Excess Demand nor Supply



At a price of 40c., consumers would be prepared to buy 90,000 hamburgers per week and suppliers would be willing to sell exactly the same quantity. Every individual hamburger producer who is willing to supply hamburgers at 40c. each would be able to sell them to consumers, and every individual wishing to buy hamburgers at 40c. each would be able to do so.

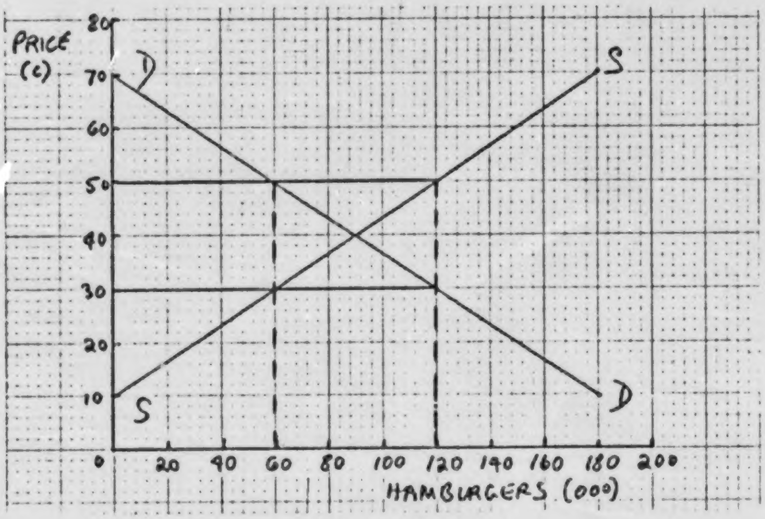
4.3 The Operation of Markets

4.3.1 If a price causes excess demand or excess supply to exist in a market, forces in the market will change the price of the good and the quantity bought and sold. These forces will eventually eliminate any excess demand or excess supply.

4.3.1.1 If at a given price excess supply were to exist in a market, competition among suppliers would force down the price of the good. Simultaneously, at lower prices a larger quantity of the good will be demanded. Thus at lower prices the excess supply will be reduced. Eventually a price would be reached at which excess supply will be zero.

Example. Diagram 4.3.1(1) again illustrates the market for hamburgers in a U.S. city.

Diagram 4.3.1(1) The Market for Hamburgers in a U.S. City



It is possible for at least one hamburger to be offered for sale and to be demanded at any price above 10c. and below 70c. This is because at least one supplier is prepared to sell a hamburger for at least 10c. while at least one buyer is prepared to pay up to 70c. for a hamburger. If one buyer and one seller agreed to terms of exchange within this price range and if the terms of exchange were known to all other potential buyers and sellers in the market, they would act on the information provided.

If one hamburger were sold to a consumer for 50c. and as a result all suppliers attempted to sell hamburgers for 50c. each, some/

some suppliers would discover that they could not find customers at that price. This is because (as shown in 4.2.3) excess supply would exist at 50c. since 60,000 more hamburgers would be offered for sale than consumers would wish to buy.

Some suppliers who could not find individuals wishing to buy hamburgers at 50c. would be willing to lower their asking price below 50c., because the supply curve indicates that some suppliers would be prepared to sell hamburgers at prices less than 50c. But this act of lowering the price would provide information to all other buyers and sellers in the market.

Buyers who are prepared to pay 50c. or more for a hamburger will seek those suppliers offering hamburgers for sale at less than 50c. Additionally, at lower prices some consumers will buy more hamburgers. Others who would not buy at the higher prices will now be prepared to purchase hamburgers..

At 40c. each, the quantity consumers would be prepared to buy is 90,000 per week, and this exactly equals the quantity that firms would be prepared to supply. The excess supply which originally existed at 50c. would therefore be eliminated.

4.3.1.2 If at a given price excess demand were to exist in a market, competition between consumers would force up the price of a good. Simultaneously, at higher prices, suppliers would be willing to sell a greater quantity of the good. Thus at higher prices excess demand would be reduced. Eventually a price will be reached at which excess demand will be zero.

Example. If the original exchange between one buyer and seller in the market for hamburgers were agreed at 30c., and as a result all sellers decided to ask for a price of 30c. each for hamburgers, some potential buyers would find it impossible to obtain hamburgers. This is because, as shown again in Diagram 4.3.1.1, excess demand would exist at a price of 30c. since 60,000 more hamburgers would be desired by consumers than firms would be prepared to supply. Those individuals who could not obtain hamburgers would be willing to bid up the price of hamburgers because, as indicated by the demand curve, some consumers would be prepared to pay prices above 30c. to obtain hamburgers. But those individuals who pay more than 30c. each for hamburgers would provide information to all other buyers and sellers in the market.

Suppliers who are prepared to sell hamburgers for 30c. or less will seek those consumers who are prepared to pay more than 30c. to obtain hamburgers. Additionally, at higher prices some suppliers will sell more hamburgers. Other suppliers who would/

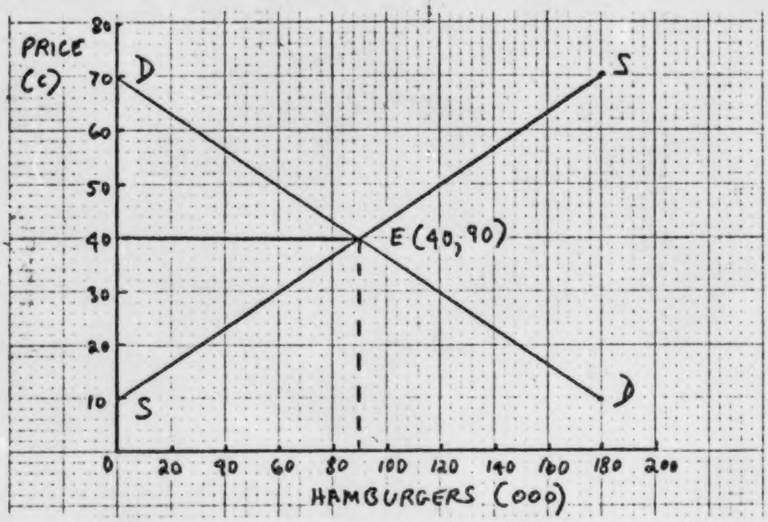
would not sell hamburgers at lower prices will now be prepared to sell hamburgers.

At 40c. each the quantity consumers in total would be prepared to buy would exactly equal the quantity firms would be willing to supply, i.e. 90,000 per week. The excess demand which originally existed at 30c. would therefore be eliminated.

4.3.2 When the forces which act to eliminate excess demand or excess supply exactly offset each other, a market is defined as being in equilibrium. The price at which equilibrium occurs in a market is the price which allows all individuals who wish to buy a good to obtain as much as they wish at that price, and enables all producers who wish to sell the good to sell as much as they wish at that price. The price at which the intentions of all potential buyers and sellers are exactly matched is called the equilibrium price, and the identical quantity of the good which the two sides wish to buy and sell at that price is called the equilibrium quantity.

Example. In Diagram 4.3.2(1) the equilibrium price of hamburgers in this market is 40c., since all buyers who wish to purchase hamburgers at 40c. each are able to do so and all firms who wish to sell hamburgers at 40c. each are able to find buyers.

Diagram 4.3.2(1) Equilibrium Price and Quantity in a Market



Diagrammatically, the equilibrium price is established where the demand and supply curves intersect, i.e. at point E. At the price of 40c. the market is just cleared since both excess demand and excess supply are zero. The quantity bought and sold at 40c. is 90,000 per week and there are no unsatisfied buyers/

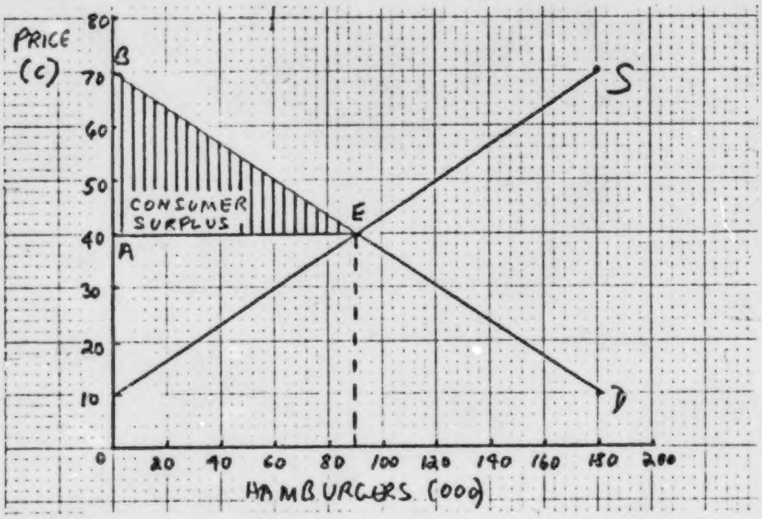
buyers or sellers. In this market 90,000 hamburgers per week is the equilibrium quantity.

4.3.3 When exchange takes place in a market, gains accrue to both consumers and producers. If such gains did not exist there would be no incentive for exchange to take place.

4.3.3.1 A demand curve relates the quantities of a good individuals would buy at different prices, and it also relates the maximum prices which individuals would be willing to pay for different quantities of a good. However, if individuals can obtain units of a good at a price which is less than they would be prepared to pay, they would derive an additional gain from exchange. This additional gain is called consumer surplus, and can be measured by the difference between the price individuals actually pay for units of a good, and the higher prices they would be prepared to pay.

Example. Diagram 4.3.3.1(1) again illustrates the market for hamburgers in a U.S. city.

Diagram 4.3.3.1(1) Measurement of Consumer Surplus



The equilibrium price of hamburgers is 40c. and the equilibrium quantity is 90,000 per week. This means that a price of 40c. is paid by every individual for every hamburger bought. But according to the downward-sloping demand curve, some consumers would have been prepared to pay more for hamburgers.

For example, one individual would be prepared to pay up to 70c. for the first hamburger, but he has to pay only 40c. He has a consumer surplus of 30c. Similarly, for successive quantities up/

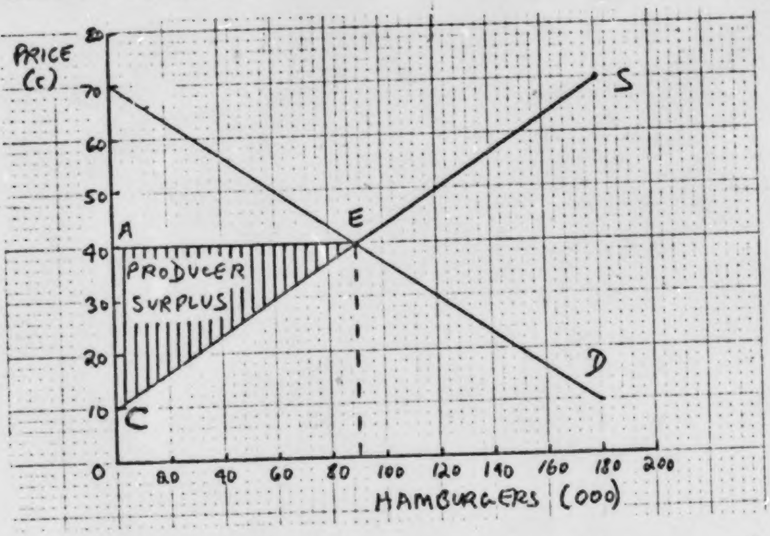
up to 90,000 per week there is a difference between the price of 40c. consumers pay for hamburgers and the price they would be willing to pay.

This difference is called consumer surplus and is illustrated graphically for each quantity of hamburgers by the vertical distance between the line AE (the price actually paid, i.e. 40c.) and the demand curve (the prices individuals would be willing to pay for different quantities). Hence for successive quantities of hamburgers up to 90,000 per week consumer surplus is denoted by a series of vertical lines between AE and the demand curve. At the equilibrium price of 40c. consumer surplus is measured by the shaded triangle BAE.

4.3.3.2 A supply curve relates the various quantities of a good suppliers would be prepared to sell at different prices, and it also relates the minimum prices at which suppliers would be prepared to sell different quantities of a good. If suppliers can sell units of a good at a price which is higher than they would be prepared to accept, they derive an additional gain from exchange. This additional gain is called producer surplus, and can be measured by the difference between the price suppliers actually receive for selling units of a good and the lower prices they would be prepared to accept.

Example 1. Diagram 4.3.3.2(1) illustrates how producer surplus is measured.

Diagram 4.3.3.2(1) Measurement of Producer Surplus



Assuming that the market is in equilibrium, a price of 40c. for hamburgers is received by every supplier for each of the 90,000 hamburgers sold. But the upward sloping supply curve indicates/

indicates that suppliers would be willing to sell hamburgers for prices less than 40c.

For example, one supplier would be prepared to sell a hamburger for just over 10c., but in fact receives 40c. He has a producer surplus of 30c. Similarly, for successive quantities of hamburgers up to 90,000 there is a difference between the price suppliers actually receive and the prices they would be prepared to accept.

This difference is called producer surplus and is illustrated graphically for each quantity of hamburgers by the vertical distance between the line AE (the price received by sellers for each hamburger, i.e. 40c.) and the supply curve (the prices suppliers would be prepared to accept for different quantities). Hence for successive quantities of hamburgers up to 90,000, producer surplus is denoted by a series of vertical lines between AE and the supply curve. At the equilibrium price of 40c. producer surplus is measured by the shaded triangle CAE.

Example 2. An example of how both consumer and producer surplus provide the motivating forces in a market to achieve equilibrium is provided by Myron Joseph's(1) *role-playing wheat game. This educational experiment is based on a hypothetical wheat market in which a typical class of economics students adopt the role of dealers, half of whom buy and the other half sell wheat.*

In the experiment a card is given by the instructor to each student requiring him to buy or sell 1000 bushels of wheat for not more or less than a certain price, as shown in Table 4.3.3.2(1).

Table 4.3.3.2(1) Distribution of Instruction Cards

Price ($)	Number of Buyers (not more than the price)	Number of Sellers (not less than the price)
2.80	4	-
2.60	4	2
2.40	4	2
2.20	4	2
2.00	4	2
1.80	4	4
1.60	2	4
1.40	2	6
1.20	2	6
1.00	2	4

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(1) "Role Playing in Teaching Economics" by Myron L. Joseph, in American Economic Review, Vol.LV, May 1965, Number 2.

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Students are told that when the fictional market opens, they should adopt the role of dealers for clients and attempt to get the best they can in a transaction. Once the game commences students are free to contact each other to discuss terms of exchange. Each time an exchange is agreed, the instructor makes the price known to all students, and those students who have completed a deal may then pick up fresh cards and start again.

After a certain time the market is closed, and the whole class can then see the range of prices at which exchange actually took place, and the number of transactions which was recorded at each price. Table 4.3.3.2(2) shows the results from one experiment conducted by Joseph and which he presented at an annual meeting of the American Economics Association.

Table 4.3.3.2(2) Distribution of Transactions

Price ($)	Number of Transactions
2.60	1
2.50	0
2.40	1
2.30	0
2.20	6
2.10	1
2.00	15
1.90	25
1.80	27
1.70	20
1.60	16
1.50	13
1.40	5
1.30	1
1.20	3
1.10	1
1.00	1

According to Joseph, the initial exchanges were agreed at a wide range of prices. But then there was a tendency for prices to move towards a theoretical equilibrium level of $1.80. By the end of the game virtually every exchange was agreed at or close to $1.80.

This game illustrates the role of information in markets, since the disparity in prices soon disappeared once the terms of each exchange became known to all buyers and sellers. Any exchange at prices well above $1.80 (which would have enlarged the area of producer surplus if all deals were made at that price) resulted in fervent competition among sellers which in turn drove prices down. Conversely, any exchanges arranged at prices well below $1.80 (which would have extended the area of consumer surplus if all exchanges had taken place at that price) resulted in keen competition among buyers which in turn drove prices up.

4.4 Changes in Market Equilibrium

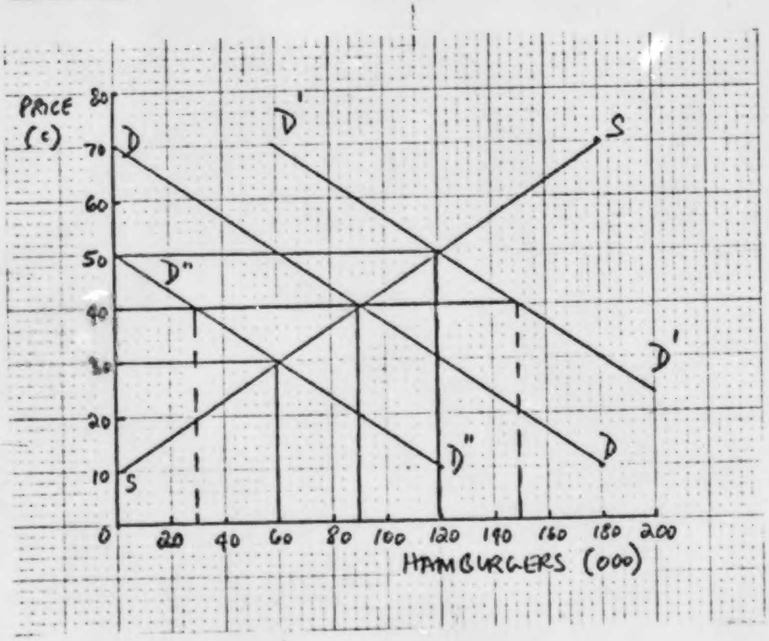
4.4.1 If a market were in equilibrium and if any of the conditions determining demand or supply were to change, forces would establish a different equilibrium price and/or a different equilibrium quantity.

4.4.1.1 Assuming that the supply conditions of a good remain unchanged, an increase in demand would lead to an increase in equilibrium price and an increase in equilibrium quantity, while a decrease in demand would lead to a decrease in equilibrium price and a decrease in equilibrium quantity.

Example. Diagram 4.4.1.1(1) illustrates again the market for hamburgers in a U.S. city, in which the original equilibrium price and quantity are 40c. and 90,000 per week. If the price of all other meat products were to rise and if this led to consumers substituting hamburgers for other meat, i.e. wishing to buy more hamburgers at every price, this would be defined as an increase in demand for hamburgers, and would be represented by a shift of the demand curve from DD to D'D'.

(N.B. There is a difference between an increase in demand and an increase in the quantity demanded. The former refers to a shift in the position of the whole curve caused by a change in a factor other than the price of the good in question. The latter refers to an increase in the quantity which would be demanded if the price were to be lower, other factors remaining unchanged, and is represented by a movement along a demand curve.)

Diagram 4.4.1.1(1) A Change in Demand with Supply Conditions Constant



Assuming no change in supply conditions, at the original equilibrium price of 40c. there would be excess demand for hamburgers given the demand curve in position D'D'. Suppliers would still wish to sell 90,000 hamburgers per week but consumers would be prepared to buy 150,000 hamburgers per week at a price of 40c.

For the reasons explained in 4.3.1.2 upward pressure would be exerted on price until a new equilibrium point were established at 50c., where D'D' intersects the supply curve. The new equilibrium price of 50c. and the new equilibrium quantity of 120,000 hamburgers per week would both be higher than the original equilibrium price and equilibrium quantity.

Conversely, if a health risk were to arise in connection with eating hamburgers, and if consumers wished to substitute other meat products for hamburgers and buy fewer hamburgers at every price, the decrease in demand for hamburgers would be represented by a shift of the demand curve from DD to D"D". At the original equilibrium price of 40c. there would be excess supply of 60,000 hamburgers per week, assuming supply conditions remained constant. Consumers would now wish to buy only 30,000 hamburgers per week whereas suppliers would be prepared to sell 90,000 per week.

For the reasons explained in 4.3.1.1 downward pressure would be exerted on price until a new equilibrium point were established at 30c., where D"D" intersects the supply curve. The new equlibrium price of 30c. and the new equilibrium quantity of 60,000 hamburgers per week would both be lower than the original equilibrium price and equilibrium quantity.

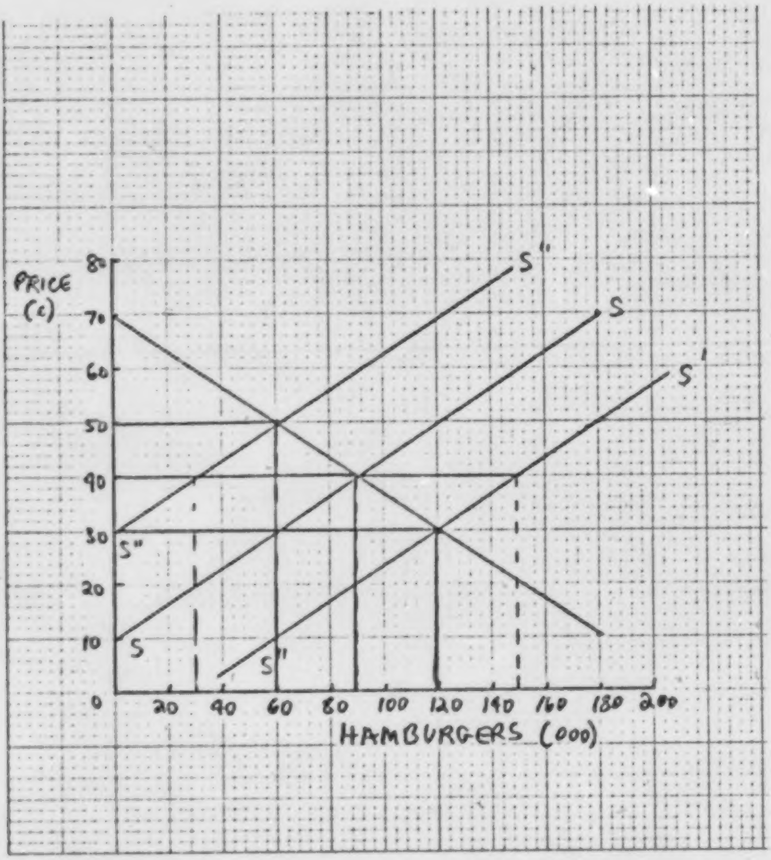
In each of the above examples the new equilibrium price and equilibrium quantity would be determined as a result of a shift in the demand curve and a movement along an unchanged supply curve.

4.4.1.2 Assuming that the demand conditions for a good remain unchanged, an increase in supply would lead to a fall in equilibrium price and an increase in equilibrium quantity, while a decrease in supply would lead to a rise in equilibrium price and a fall in equilibrium quantity.

Example. Suppose that in the market for hamburgers, suppliers were able to use cheaper imports of raw meats to produce hamburgers and as a result they would be willing to sell more hamburgers at every price. This increase in supply is represented by a shift of the supply curve from SS to S'S', as shown in Diagram 4.4.1.2(1).

(N.B./

Diagram 4.4.1.2(1) A Change in Supply with Demand Conditions Constant



(N.B. There is a difference between an increase in supply and an increase in the quantity supplied. The former refers to a shift in the whole position of the supply curve caused by a change in a factor other than the price of the good in question. The latter refers to an increase in the quantity which would be supplied if the price were to be higher, other factors remaining unchanged, and is represented by a movement along a supply curve.)

Assuming no change in the demand for hamburgers, there would be excess supply at the original equilibrium price of 40c. since consumers would still wish to buy 90,000 hamburgers per week whereas suppliers would be prepared to sell 150,000 hamburgers per week at 40c. each. The forces illustrated in 4.3.1.1 would generate downward pressure on price until a new equilibrium price of 30c. were reached, where the supply curve S'S' intersects the demand curve.

As a result of the increase in supply, the new equilibrium price would be lower than the original equilibrium price, and the new equilibrium quantity of 120,000 hamburgers per week would be greater than the original equilibrium quantity of 90,000 per week.

Conversely, if hamburger suppliers were to experience a rise in production costs following an increase in wages paid to all workers employed in producing hamburgers, and were prepared to supply fewer hamburgers at every price, this would be represented by a shift of the supply curve from SS to S"S".

Assuming no change in the demand curve, there would be excess demand for hamburgers at the original equilibrium price of 40c. since consumers would still wish to buy 90,000 per week whereas suppliers would be prepared to sell only 30,000 per week. As explained in 4.3.1.2 forces would generate upward pressure on price until a new equilibrium position were reached. In this market it would occur at a price of 50c. and a quantity of 60,000 hamburgers where the supply curve S"S" intersects the demand curve.

As a result of the decrease in supply, the new equilibrium price would be higher than the original equilibrium price, and the new equilibrium quantity of 60,000 hamburgers per week would be lower than the original equilibrium quantity of 90,000 per week.

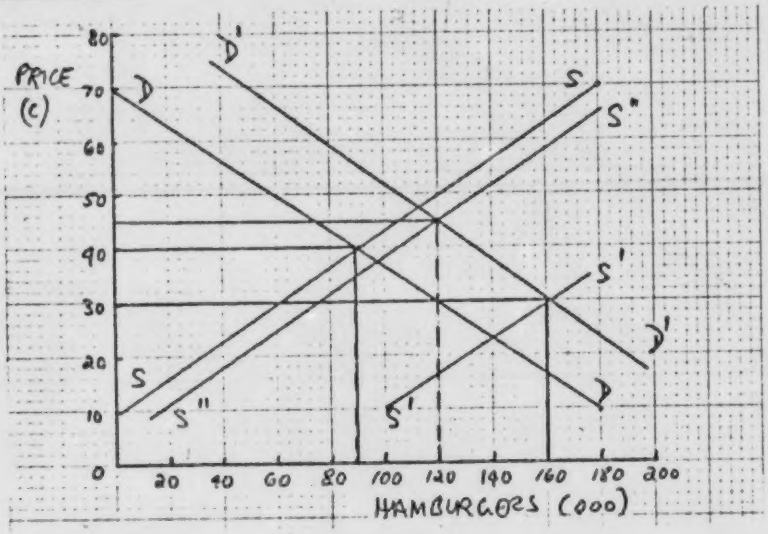
In each of the above examples the new equilibrium price and equilibrium quantity would be determined as a result of a shift in the supply curve and a movement along an unchanged demand curve.

4.4.1.3 If there were an increase in demand for a good and simultaneously an increase in supply of the good, the equilibrium quantity would rise/

rise. The equilibrium price of the good, however, could rise, fall or remain the same, depending on the extent to which demand increased relative to supply.

Example. In the market for hamburgers in a U.S. city represented in Diagram 4.4.1.3(1), suppose the demand for hamburgers were to increase as a result of a rise in the prices of other meat products, and the supply of hamburgers were also to increase as a result of a fall in production costs.

Diagram 4.4.1.3(1) An Increase in Demand and an Increase in Supply



The increase in demand is shown by the shift in the demand curve from DD to D'D' and the increase in supply is indicated by the shift of the supply curve from SS to S'S'. As a result of these simultaneous changes the equilibrium price of hamburgers would fall from 40c. to 30c., as indicated by the intersection of D'D' and S'S'. The new equilibrium quantity would increase from 90,000 per week to 160,000 per week.

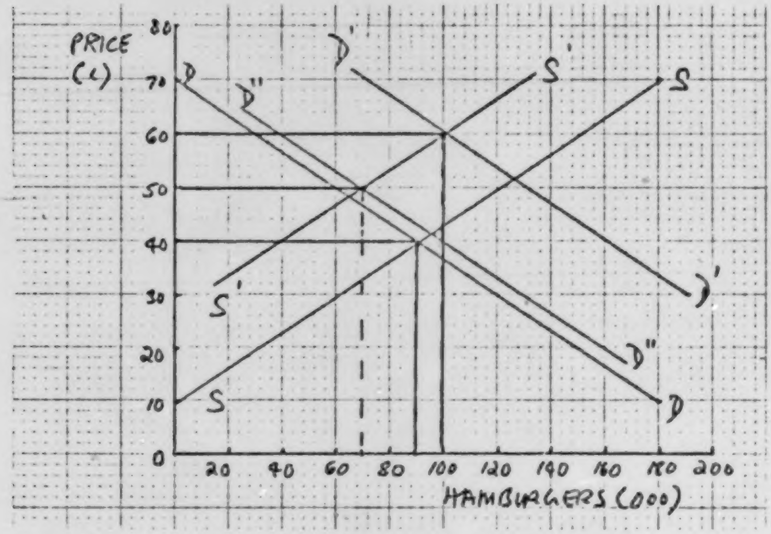
While the equilibrium quantity will always increase as a result of these increases in supply and demand, equilibrium price might rise or even remain at the original level instead of decreasing. If the supply curve were to shift only slightly from SS to S"S", the new equilibrium price and quantity would be 45c. and 120,000 per week, i.e. equilibrium quantity would increase and equilibrium price would increase also. In addition, it would be possible for both curves to shift just sufficiently to maintain equilibrium price at 40c.

4.4.1.4 If the demand for a good were to increase and the supply of the good were/

were to simultaneously decrease, the equilibrium price of the good would rise. The equilibrium quantity of the good might increase, decrease or remain the same depending on the extent of the relative changes in demand and supply.

Example. In the market for hamburgers, suppose consumers wish to buy more at every price as a result of an increase in the prices of all other meats, and that simultaneously hamburger suppliers were to experience a rise in production costs. The impact of these changes in supply and demand is illustrated in Diagram 4.4.1.4(1).

Diagram 4.4.1.4(1) An Increase in Demand and a Decrease in Supply



The demand curve would shift from DD to D'D' and the supply curve would shift from SS to S'S'. As a result, the new equilibrium price and quantity are established where D'D' and S'S' intersect. The new equilibrium price would be 60c. and the new equilibrium quantity would be 100,000 per week, both of which are higher than the original equilibrium levels.

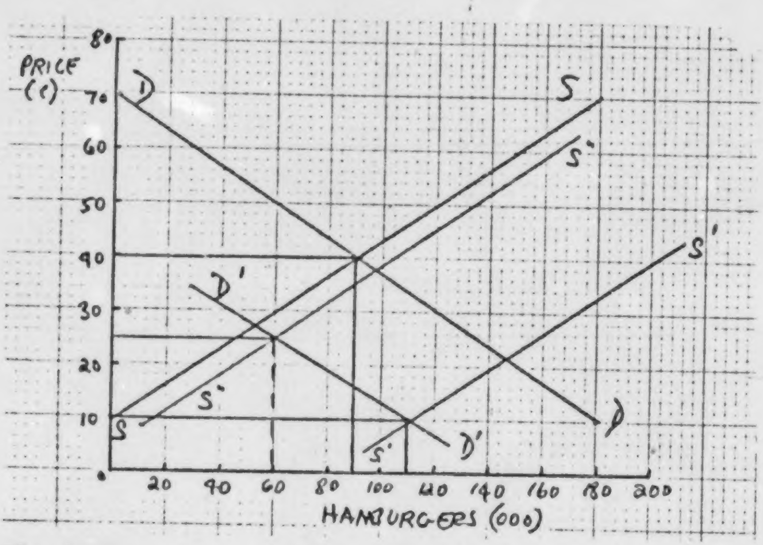
While equilibrium price would always rise as a result of these two simultaneous changes in supply and demand, equilibrium quantity might fall, or remain at the same level instead of increasing. If the demand curve were to shift only slightly from DD to D"D" the new equilibrium price and quantity would be 50c. and 70,000 hamburgers per week. So although equilibrium price would still increase, equilibrium quantity would fall from its original level. Also, it would be possible for both curves to shift just sufficiently to maintain the equilibrium quantity at 90,000 per week.

4.4.1.5/

4.4.1.5 If the supply of a good were to increase and the demand for the good were to simultaneously decrease, the equilibrium price of the good would fall but the equilibrium quantity might increase, decrease or remain at the same level.

Example. Suppose that suppliers discovered a more efficient method of producing hamburgers and that simultaneously consumers learned that there might be a health risk involved in eating hamburgers. The effect of these changes in the market for hamburgers is illustrated in Diagram 4.4.1.5(1).

Diagram 4.4.1.5(1) An Increase in Supply and a Decrease in Demand



The increase in supply is denoted by the shift in the supply curve from SS to S'S' and the decrease in demand by a shift in the demand curve from DD to D'D'. The point at which D'D' and S'S' intersect denotes the new position of equilibrium in the market, i.e. a price of 10c. and a quantity of 110,000 hamburgers per week bought and sold.

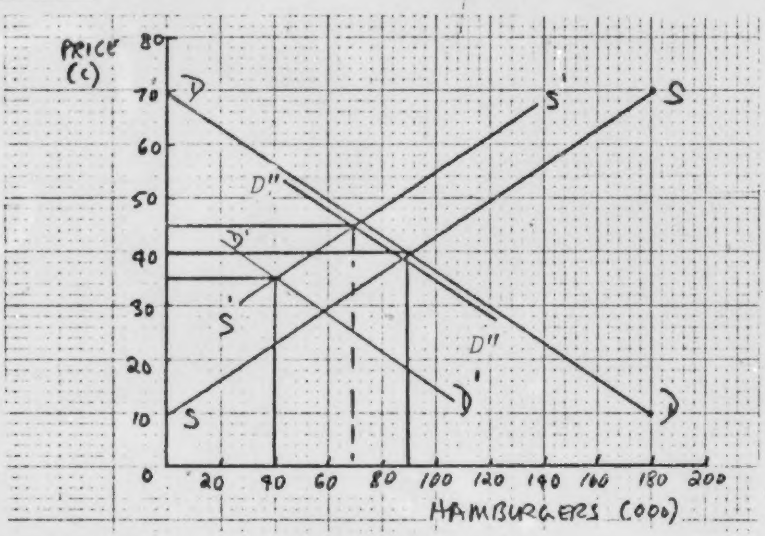
Although equilibrium price of the good would always fall as a result of these two changes in supply and demand, equilibrium quantity might fall or remain unchanged instead of increasing. If the supply curve were to shift from SS to S"S" instead of to S'S', the new equilibrium price and quantity would be 25c. and 60,000 hamburgers per week, i.e. the equilibrium price would decrease and the equilibrium wuantity would decrease also. It would be possible for both curves to shift just sufficiently to maintain the equilibrium quantity at 90,000 per week.

4.4.1.6/

4.4.1.6 If the demand for a good and the supply of a good were both to decrease, the equilibrium quantity of the good would fall, but equilibrium price might increase, decrease or remain at its original level.

Example. Suppose that some consumers substituted hot dogs for hamburgers, and simultaneously hamburger producers experienced a rise in costs. The impact of these two changes is shown in Diagram 4.4.1.6(1).

Diagram 4.4.1.6(1) A Decrease in Demand and a Decrease in Supply



The decrease in demand is represented by a shift in the demand curve from DD to D'D' and the decrease in supply by a shift from SS to S'S'. As a result, the equilibrium price would fall from 40c. to 35c. and the equilibrium quantity would fall from 90,000 hamburgers per week to 40,000 per week.

Although equilibrium quantity would always fall as a result of a simultaneous decrease in supply and demand, equilibrium price could increase or remain unchanged instead of decreasing. If the demand curve shifted only slightly from DD to D"D" instead of to D'D', the new equilibrium price would be 45c. which is higher than the original equilibrium price. And it would be possible for both curves to shift just enough to maintain equilibrium price at 40c.

4.5 Intervention in the Market

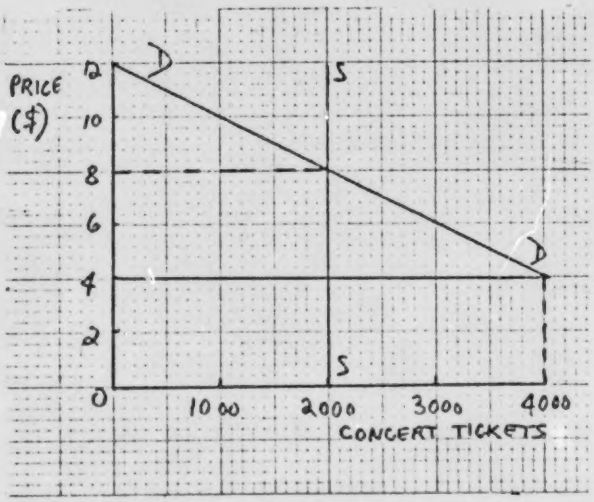
4.5.1 Market intervention or market regulation occurs when a non-market force causes the price and quantity of a good bought and sold in a competitive market to be different from the price/quantity combination which would occur if the market were allowed to operate freely.

> *Example. Tickets for major sporting events such as the Wimbledon tennis tournament in London, and Muhammad Ali's World championship fights are often priced below the level which would occur if the forces of supply and demand were allowed to operate freely. The result is that more people wish to buy tickets at the prevailing price than there are tickets available. Conversely, minimum wage laws in the U.S. which stipulate that employees in certain firms must be paid at least $2.30 per hour provide an example of the price in a resource market which is set above the equilibrium level, since more people are willing to work at $2.30 per hour than there are jobs available.*

4.5.1.1 When the price of a good is fixed below the equilibrium level, a price ceiling is said to exist in the market for the good. Price alone will be an inadequate mechanism for allocating the available supply of the good among potential buyers, and some other allocative mechanism such as first come - first served, reliance on suppliers' preferences, or rationing, may be employed.

> *Example. When world famous pop groups stage a concert, such as the Beatles' famous concert at the Hollywood Bowl, the price of the tickets is often below the equilibrium price which would be established if tickets were sold without restriction in a competitive market.*

Diagram 4.5.1.1(1) A Price Ceiling in a Market



Suppose Diagram 4.5.1.1(1) illustrates the market for a pop concert in a concert hall where the capacity is 2000 identical seats. Supply is therefore represented by the completely inelastic supply curve SS. If the demand schedule for tickets were represented by DD, the equilibrium price would be $8 per ticket.

But if the organizers of the concert decided to fix the price of tickets at $4 each, excess demand for tickets would exist. In fact, at a price of $4 twice as many people would wish to see the concert as there are seats available, since at $4 each 4000 tickets would be desired.

Some way would have to be found of allocating the available 2000 tickets among potential buyers. One obvious method would be to allocate tickets to the first 2000 buyers who appeared This is why large queues are often seen when tickets for major events go on sale.

Alternatively the concert organizers might allocate some of the 2000 tickets according to their own preferences, e.g. to personal friends, disc jockeys, and other showbusiness personalities. In addition, a system of rationing might be used, whereby each individual would be allowed to purchase a limited number of tickets, e.g. two.

When price ceilings are in operation and excess demand exists, a black market tends to develop, in which unites of a good are exchanged for prices higher than the fixed level. Black markets, despite being illegal, serve the function of establishing equilibrium prices and quantities in a market. If the black market is 'perfect', the higher price will be the equilibrium price, i.e. all buyers who want a ticket at that price can obtain one, and any ticket owner who wishes to sell a ticket at that price can do so.

The motivation for exchange at black market prices exists because, as shown by the downward sloping demand curve, some individuals are prepared to pay much higher prices than others to obtain units of a good and there is no guarantee that those individuals who are willing to pay higher prices actually receive any units of the good by the initial allocation.

In the hypothetical market for pop concert tickets, for example, there is at least one individual who is prepared to pay up to $12 for a ticket, and at least one individual who would be willing to pay the fixed price of $4 but no more. Suppose the latter individual actually obtains a ticket for $4 by turning up early when the tickets go on sale, but that the former individual arrives too late and discovers that the tickets have all been sold. Exchange would be possible between these two individuals/

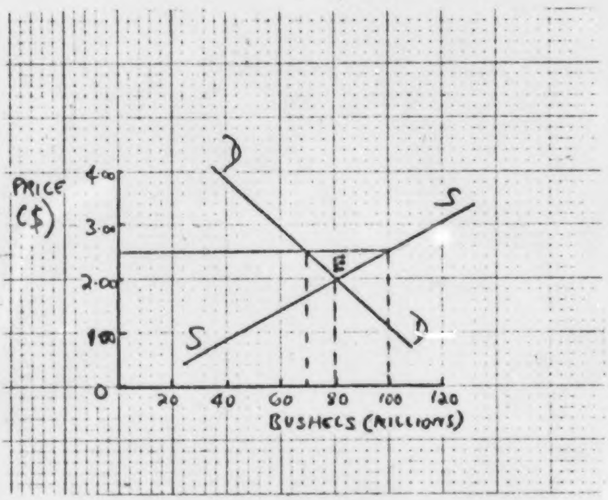
individuals because the person with the ticket would prefer any sum of money above $4 to the ticket, whereas the person without a ticket would be prepared to sacrifice up to $12 to obtain a ticket. Thus exchange of a ticket for a price between $4 and $12 can occur because both individuals would gain by the exchange.

In this one-to-one situation, the price of the ticket is indeterminate - it will lie between $4 and $12, and will depend ultimately on the bargaining skills of the buyer and seller. However, if two similar buyers and one seller constituted the market the price of the ticket would be $12, and conversely if one buyer and two similar sellers constituted the market, the price of the ticket would be $4.01.

4.5.2 When the price of a good is fixed above the equilibrium level, a price floor is said to exist in the market for the good. At the fixed price there would be excess supply of the good. and some method other than price would have to be found of disposing of the surplus.

Example. For many years until the late 1960s the prices of many agricultural goods in the U.S. were fixed above the equilibrium level. Diagram 4.5.2(1) illustrates the implications of such price floors in a wheat market.

Diagram 4.5.2(1) A Price Floor in a Wheat Market



Suppose that DD and SS represent the demand and supply curves for wheat and that the U.S. government were to set a price floor at $2.50 per bushel, which is higher than the equilibrium price of $2.00 as shown at point E. The quantity of wheat which/

which farmers would be prepared to supply at $2.50 is 100 million bushels per year, whereas the quantity of wheat consumers would be prepared to buy at the regulated price is 70 million bushels per year. Hence a situation of excess supply of 30 million bushels per year would exist with a $2.50 per bushel price floor.

In imposing a price floor, the regulating agency faces the problem of disposing of the excess supply. One solution would be to destroy the surplus. While this is obviously a waste of resources, some European countries, notably France, have resorted to this course of action for many agricultural goods. Society as a whole suffers because fewer goods are available, but if the demand for these agricultural goods is relatively inelastic the income of the farmers, i.e. revenue from the sale of these agricultural goods, will be higher, the higher the price. Indeed, such an argument is often used to justify these schemes.

Alternatively, the government could buy the surplus, stockpile it, and release it on to the market at a time when crop production was very low. Such a scheme could help stabilise price over time. In 1958 - a year of extremely high excess supply of certain crops - the U.S. government purchased 260 million bushels of grain, 260 million bushels of corn, and over 500 million bushels of wheat.

Another option is to sell the surplus wheat abroad. In recent years large sales of such wheat to Russia have occurred.

One further choice available to the government is to pay farmers not to produce the excess supply. In Diagram 4.5.2(1) this would involve the government trying to restrict the quantity of wheat supplied to 70 million bushels per year. This policy has been tried by the U.S. government, and many farmers have been paid by the government not to produce!

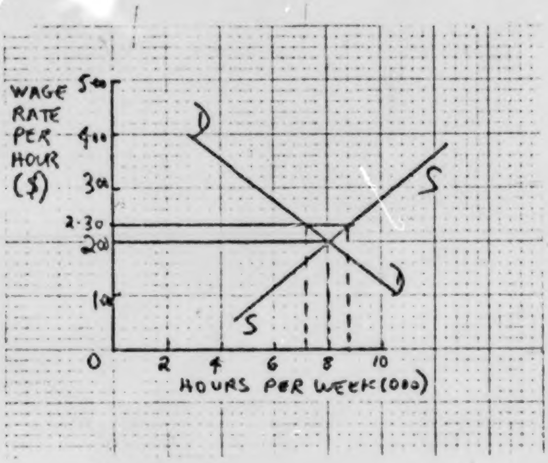
One further example of price floors, this time in a resource market, is the minimum wage law which operates in the U.S. This law makes it illegal for certain types of firms to hire labor at less than $2.30 per hour.

Suppose that Diagram 4.5.2(2) illustrates a hypothetical market for low skilled labor. According to the market demand and supply schedules, the equilibrium wage rate would be $2.00 per hour. At that rate, 200 people each working 40 hours per week would be employed, i.e. the quantity of labor offered and hired at $2.00 per hour would be equivalent to 8,000 hours per week.

But if a legal minimum wage of $2.30 were in effect, an excess supply of low skilled labor would exist. Individuals would wish/

wish to work 8,800 hours per week, i.e. 220 people would wish to be employed at a rate of $2.30 per hour. Firms, however, would wish to employ individuals to work 7,200 hours per week, i.e. they would wish to employ 180 people at a rate of $2.30 per hour.

Diagram 4.5.2(2) Effect of a Minimum Wage Law in a Competitive Labor Market



There would be excess supply of labor amounting to 40 people, comprising 20 extra people who would wish to work at a rate of $2.30 compared with $2.00, and 20 people originally employed at $2.00 but whom firms would no longer be willing to hire at $2.30. The 180 people who remain employed, however, would be better off than before.

Many economists have tried to discover the impact of minimum wage legislation on employment, especially on those sections of the labor force, such as teenagers and low skilled workers, who would be most affected by minimum wage laws. A study by Y. Brozen[1] in the late 1960s found that in the U.S. successive increases in the legal minimum wage were reflected in rising teenage unemployment, and some years later T. G. Moore[2] discovered that the unemployment rate of non-whites in the 16-19 age range increased by 1.8% for each 1% rise in the ratio of the legal minimum wage to the average hourly earnings of production workers in private, non-agricultural employment.

Controversy rages in the U.S. about minimum wage laws. Some people benefit, others suffer, but there is little disagreement that such laws cause unemployment among various groups of workers and consequently make total output lower than it otherwise would be.

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[1] Y Brozen, "The Effect of Statutory Minimum Wage Increases on Teenage Unemployment," Journal of Law and Economics, v.12 (April 1969)

[2] T G Moore, "The Effect of Minimum Wages on Teenage Unemployment Rates," Journal of Political Economy, v.79 (July/August 1971) p 901

4.5.3 The equilibrium price and equilibrium quantity of a good may be changed by the imposition of a tax on each unit of the good bought and sold.

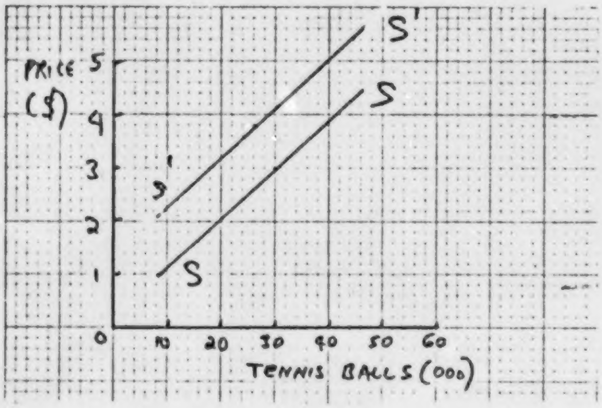
Example. Table 4.5.3(1) gives data relating to the supply schedules in the market for tennis balls before and after the imposition of a tax of $1 per tennis ball.

Table 4.5.3(1) Effect of a Tax on the Supply Schedule of a Good

Price $	Quantity Supplied per week	Price plus Tax $
1	10,000	2
2	20,000	3
3	30,000	4
4	40,000	5
5	50,000	6

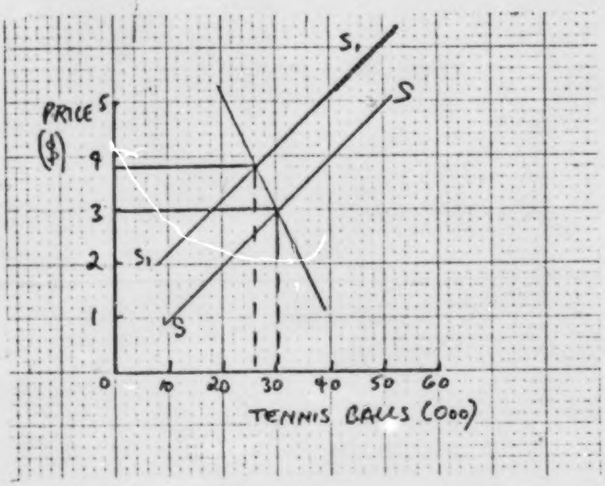
The imposition of a tax affects the market supply curve through its impact on the marginal cost curve of each producer, who would now have to pay to the government $1 in tax for every tennis ball sold. Hence suppliers would be willing to supply the same quantities of tennis balls at prices $1 higher than the original prices. This change in suppliers' intentions can be represented by a shift of the supply curve for tennis balls from SS to S'S' as shown in Diagram 4.5.3(1).

Diagram 4.5.3(1) Shift of Supply Curve due to Tax



The shift of the supply curve merely indicates a change in sellers' intentions. To discover what actually happens to the equilibrium price and quantity of tennis balls it is necessary to compare the point of intersection of the supply and demand curves for tennis balls before and after the tax.

Diagram 4.5.3(2) Effect of Tax on Equilibrium Price and Quantity

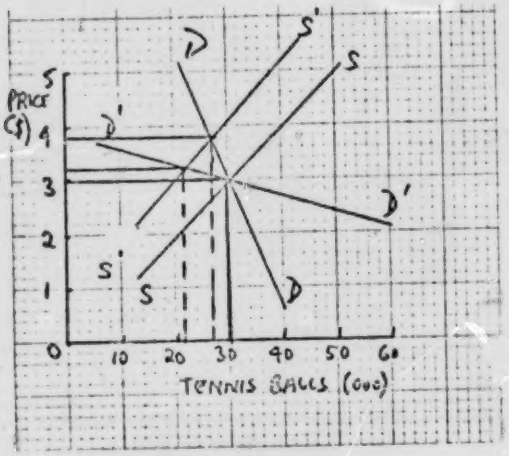


As shown in Diagram 4.5.3(2) the equilibrium price of tennis balls would rise from $3 to $3.75, and the equilibrium quantity would fall from 30,000 to 26,000.

4.5.4 If a tax were to be imposed on every unit of a good bought and sold, the extent to which equilibrium price and quantity would change, and the incidence of the tax between consumers and producers, would depend on the relative elasticities of supply and demand.

Example. If the demand for tennis balls were represented by DD as illustrated in Diagram 4.5.4(1) then for every dollar paid to the government in tax, three-quarters would fall on consumers because of the price rise from $3 to $3.75. The remaining one-quarter would fall on producers whose revenue from the sale of each tennis ball would fall by 25c., i.e. from $3 to $2.75 ($3.75 - $1 tax = $2.75).

Diagram 4.5.4(1) Effect of Tax on Equilibrium Price and Quantity with Different Demand Elasticities



But if the demand for tennis balls were represented by the more elastic demand curve D'D', the price after a tax of $1 per tennis ball was imposed would rise to $3.25, and the quantity bought and sold would fall to 23,000. For every $1 paid to the government in tax, only one-quarter would fall on consumers through the rise in price from $3 to $3.25. The remaining three-quarters would fall on producers whose revenue from the sale of each tennis ball would now be reduced by 75c., i.e. from $3 to $2.25 ($3.25 - $1 tax = $2.25).

4.5.5 If a tax were imposed on every unit of a good bought and sold, there would be a loss of both consumer surplus and producer surplus.

Example.

Diagram 4.5.5(1) Effect of a Tax on Consumer Surplus and Producer Surplus

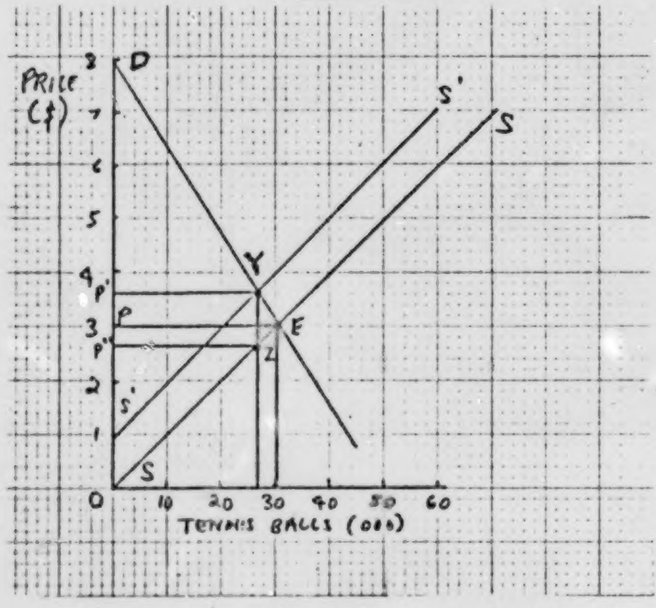


Diagram 4.5.5(1) again illustrates the effect of a tax on the market for tennis balls. At the pre-tax equilibrium price of \$3, consumer surplus is denoted by the area DPE (see 4.3.3.1). At the post-tax equilibrium price of \$3.75 consumer surplus is denoted by the smaller area DP'Y. Hence the loss of consumer surplus due to the imposition of the tax is denoted by the area P'PEY.

At the pre-tax equilibrium price of \$3, producer surplus is denoted by the area OPE (see 4.3.3.2). The post-tax price, net of tax, received by producers is \$2.75. At this price, producer surplus is denoted by the smaller area OP"Z. Hence the loss of producer surplus due to the imposition of the tax is denoted by P"PEZ.

The imposition of a tax, by raising the price paid by individuals for the good and lowering the price received by suppliers from the sale of the good, reduces the volume of transactions and thus reduces the gains from exchange.

4.6 Dynamic Adjustments in the Market

4.6.1 When conditions of demand and/or supply change in a market, a new equilibrium price or equilibrium quantity, or both, will be established. This method of analyzing market changes is called comparative statics since it involves comparing equilibrium points before and after certain demand or supply changes occur. But the analysis does not stipulate the time necessary for a new equilibrium to be established, nor does it trace the exact process by which a market adjusts from one equilibrium point to another.

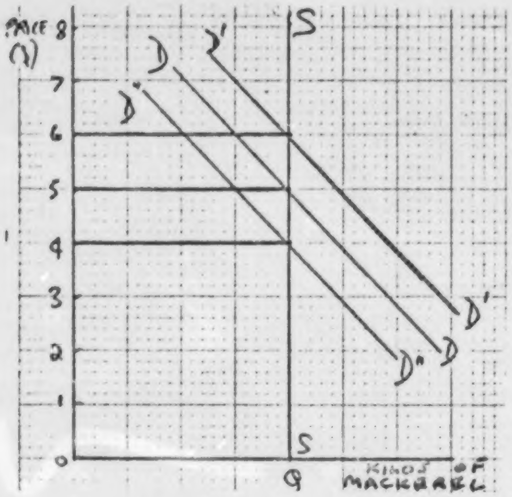
Example. Although it was shown in 4.4.1.1 that an increase in demand for hamburgers would lead to an increase in the equilibrium price of hamburgers, say from 40c. to 50c., the analysis does not specify whether the price of hamburgers would move up from 40c. to 50c. in one jump, or more gradually by one cent increases until equilibrium is restored, or even whether price would suddenly rise above 50c. immediately following the demand increase and then fall to the new equilibrium level.

4.6.2 When the demand for a good changes, price would reach different levels in different time-periods depending upon differences in elasticities of supply.

4.6.2.1 If a change in demand were to occur while a market was in progress, and the supply curve for a good were completely inelastic, indicating that producers were unable to adjust the quantity supplied no matter the price in the 'market period', the equilibrium price would change, but there would be no change in equilibrium quantity.

Example. If there were a sudden increase in demand in the market for mackerel in a given day (the market period), suppliers would be unable to bring any more mackerel to the market. The effect of this is illustrated in Diagram 4.6.2.1(1).

Diagram 4.6.2.1(1) An [illegible]crease in Demand in the Market Period



The market is initially in equilibrium with a price of $5 per kilo and OQ kilos of mackerel are bought and sold. But in this initial market period, a rise in demand for mackerel as shown by a shift in the demand curve from DD to D'D' would result solely in a rise in price from $5 to $6 per kilo. Equilibrium quantity of OQ kilos would remain the same because in this time period the supply curve SS is completely inelastic, i.e. the time period is too short to catch more mackerel and bring them to market.

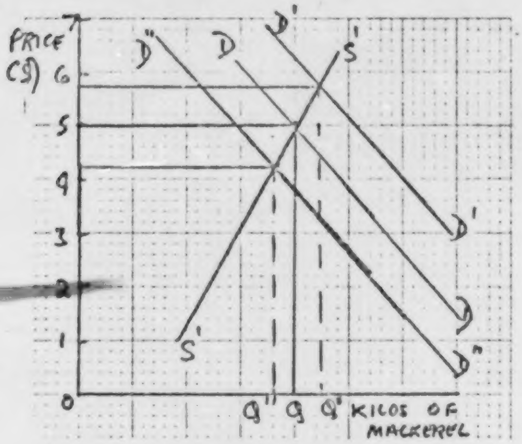
Conversely, if there were to be a sudden decrease in demand for mackerel as indicated by the shift of the demand curve from DD to D"D", in the market period equilibrium price would fall from $5 to $4 per kilo but equilibrium quantity of OQ kilos would remain.

4.6.2.2 In the short run the supply of a good would be less inelastic than in the market period because suppliers would be able to adjust the quantity hired of the variable factors of production. Comparing the short run with the market period given a change in demand, equilibrium price would change but not by as much as in the market period. Equilibrium quantity would change.

Example. Following an increase in demand, in the short run period suppliers would employ more labor and/or get existing employees/

employees to work overtime in order to catch more mackerel. The supply curve for this period would be represented by S'S' which is less inelastic than the supply curve SS in the market period. The short run period is illustrated in Diagram 4.6.2.2(1).

Diagram 4.6.2.2(1) An Increase in Demand in the Short Run



The equilibrium price in the short run would be $5.75 per kilo, as shown by the intersection of D'D' and the short run period supply curve S'S'. This price is higher than the initial equilibrium price of $5 but lower than the market period equilibrium price of $6. Equilibrium quantity would also increase from OQ to OQ' kilos of mackerel.

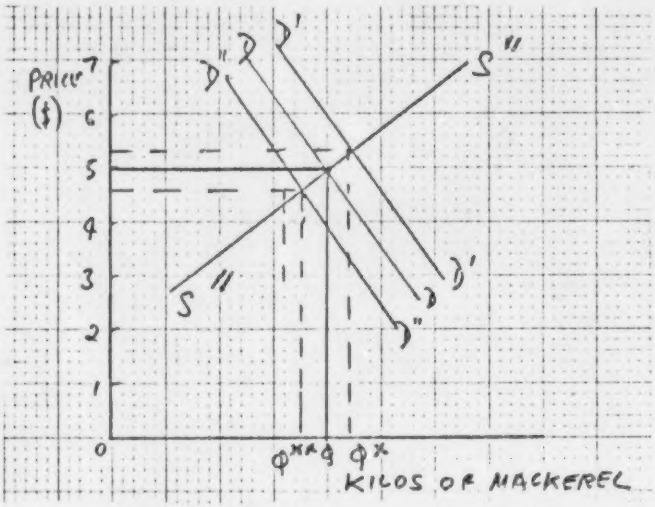
Similarly, following a decrease in demand as indicated by a shift of the demand curve from DD to D"D", equilibrium price would fall from $5 to $4.25 per kilo, which is not as large a fall as occurred in the market period. Equilibrium quantity would also fall from OQ to OQ".

4.6.2.3 In the long run, the supply of a good would be more elastic than in the short run because producers would be able to alter the quantities hired of all factors of production, and firms would be able to enter or leave the industry. Equilibrium price would differ from its original level but not by as much as in the short run period, provided the long run supply curve were upward sloping. If the long run supply curve were completely elastic, price would return to its original level. Equilibrium quantity would change by more in the long run than in the short run.

Example. Following an increase in demand for mackerel, in the long/

long run suppliers would be able to order more fishing boats as well as employing more variable factors, and new suppliers would be able to enter the market. Assuming that costs were to rise as firms expand and as new firms enter the market, the long run supply curve would slope upwards (see Unit 3.8.1), but would be more elastic than in the short run, as shown in Diagram 4.6.2.3(1).

Diagram 4.6.2.3(1) An Increase in Demand in the Long Run with Upward Sloping Supply Curve

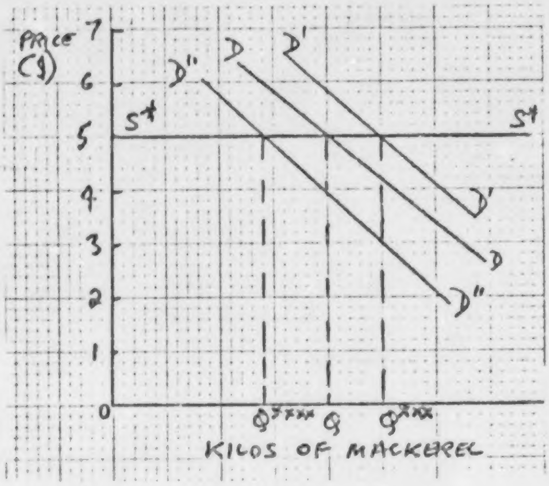


The equilibrium price in the long run would be $5.50 per kilo, determined by the intersection of DD with the long run supply curve S"S". This price is higher than the original equilibrium level but lower than equilibrium price in the short run. Equilibrium quantity would be OQ which is greater than equilibrium quantity in the short run.*

*Similarly, following a decrease in demand for mackerel as represented by a shift of the demand curve from DD to D"D", equilibrium price would fall to $4.50 which is higher than its level in the short run. Equilibrium quantity would be OQ** which is lower than the short run equilibrium quantity.*

*If, however, costs are unaffected by firms entering the market, the long run supply curve will be a horizontal line S*S* (see Unit 3.8.1) as shown in Diagram 4.6.2.3(2).*

Diagram 4.6.2.3(2) An Increase in Demand in the Long Run with Horizontal Supply Curve



*As a result of a change in demand, equilibrium price would be restored to its original level of $5 per kilo. Equilibrium quantity, however, would change by more than in the short run, rising to OQ*** as a result of an increase in demand, and falling to OQ**** as a result of a decrease in demand.*

4.6.3 In the markets for some goods and resources whose supply adjusts only after a time lag, the prices of those goods and resources tend to fluctuate in a cyclical fashion over time.

Example. For many years in the U.S. the price of pigs oscillated from year to year, sometimes reaching relatively high levels and sometimes relatively low levels. Given the time required for breeding and fattening, the quantity supplied by pig farmers could respond to market changes only after many months had elapsed.

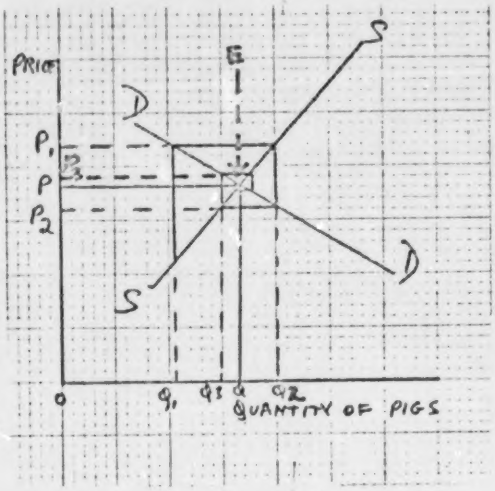
Similar patterns have occurred in the markets for resources such as physicists in the U.S., whose salaries moved substantially ahead of the levels earned in similar highly qualified occupational groups in the late 1950s and early 1960s, but then significantly declined in relation to comparable salaries in the late 1960s and early 1970s.

4.6.4 Markets which operate in such a cyclical fashion are often analyzed using what is known as a "cobweb model". Although it uses conventional tools of supply and demand, it is different in that the/

the market being analyzed operates in discrete blocks of time, and the supply curve contains a time-lag, i.e. it relates one period's prices with the next period's quantities.

> *Example. In Diagram 4.6.4(1) suppose the curves DD and SS represent hypothetical demand and supply curves for pigs.*

Diagram 4.6.4(1) The "Cobweb" Model - Convergence towards Equilibrium



If the market were initially in equilibrium at E, then the quantity of pigs which farmers would plan to produce would just match consumers' demands for pork. But suppose instead that there has been widespread disease amongst pigs causing the quantity which farmers would supply to fall to OQ_1, which is below the equilibrium level.

The price which OQ_1 will fetch on the market is OP_1, i.e. the price which consumers, as shown by the curve DD, are prepared to pay for OQ_1 units. But the relatively high price in this time period will induce farmers to increase significantly their planned supply of pigs for next year. If farmers use price OP_1 as a basis for determining next year's supply of pigs, they would bring OQ_2 units to the market. But the price which clears the market of OQ_2 is OP_2, i.e. the price according to curve DD which consumers would pay for OQ_2 pigs. This price is below the equilibrium level, whereas the previous price of OP_1 was above the equilibrium level.

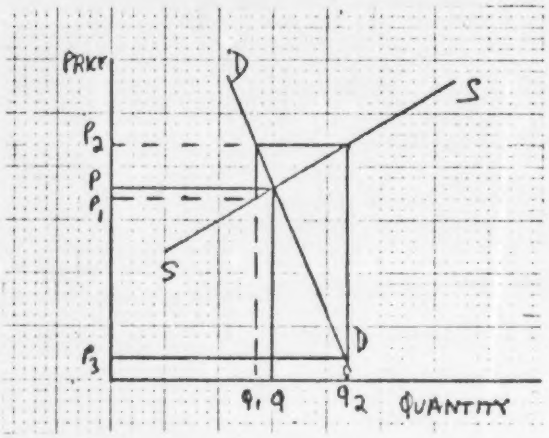
But in response to this relatively low market price, farmers will cut back on production plans and be prepared to supply next year only OQ_3 *at a price of* OP_2*. When* OQ_3 *pigs arrive at the market, the clearing price will be* OP_3*, which is once more above the equilibrium level.*

And so the process of cyclical price movement goes on. But in each time period, price moves closer to the equilibrium level until, as shown in Diagram 4.1.4, OP is finally reached. Over a period of time the market has converged towards equilibrium.

4.6.5 In some markets, using the cobweb model, cyclical movements in price do not converge towards equilibrium but move further away from equilibrium.

Example. In Diagram 4.6.5(1) if price were initially at OP_1*, in each succeeding time period price would gradually diverge from the equilibrium level; it would move to* OP_2*,* OP_3*, etc.*

Diagram 4.6.5(1) Price Diverges from Equilibrium



4.6.6 Using the cobweb model, whether a market will converge or diverge will depend upon the relative slopes of the demand and supply curves. When the supply curve is steeper than the demand curve price will converge towards equilibrium. When the demand curve is steeper than the supply curve, price will diverge from equilibrium.

Example. In Diagram 4.6.4 the supply curve SS is steeper than the demand curve DD, and price converged towards the equilibrium level OP from a situation in which the market was not in equilibrium. As price changes, suppliers adjust quantity less than do consumers, and this has a dampening effect on the cyclical movements around equilibrium.

In Diagram 4.6.5 the demand curve DD has a steeper slope than the supply curve SS, and from an original disequilibrium situation represented by price OP_1*, the price in successive time periods diverged from equilibrium. As price changes, buyers adjust the quantity demanded more than producers adjust quantity supplied, and so the cyclical price movements diverge increasingly from the equilibrium level.*

4.6.7 The cobweb model of dynamic adjustment depends on the further assumption that producers never learn from experience, and adjust their production plans accordingly. It also depends on the assumption that speculators, i.e. people who may buy quantities of the good at low prices and then re-sell later at high prices, have no role to play in the market.

Example. It is highly unlikely in the real world that, over a period of years, producers and consumers would learn nothing about the way in which the market was behaving and adjust their behavior accordingly. Pig farmers would obviously realize that basing next year's production plans on this year's prices and the expectation they would prevail was an unrealistic assumption. Despite the learning by doing effect, the cobweb model provides a realistic explanation of some markets such as the world shipbuilding market which throughout its history has been subject to feasts and famines.

OBJECTIVE EXAMINATION QUESTIONS

MICRO UNIT I

Answer Key:

1.1 Scarcity and Choice

Q 1.1.1	(2)
Q 1.1.2	(3)
Q 1.1.3	(4)
Q 1.1.4	(1)
Q 1.1.5	(1)

1.2 Preferences, Resources and Economic Efficiency

Q 1.2.1	(2)
Q 1.2.2	(2)
Q 1.2.3	(2)
Q 1.2.4	(3)
Q 1.2.5	(3)

1.3 Marginal Analysis and Opportunity Cost

Q 1.3.1	(4)
Q 1.3.2	(3)
Q 1.3.3	(2)
Q 1.3.4	(3)
Q 1.3.5	(1)

1.4 Different Economic Systems

Q 1.4.1	(3)
Q 1.4.2	(1)
Q 1.4.3	(4)
Q 1.4.4	(4)
Q 1.4.5	(3)

1.1.1 The concept of scarcity means that resources

1 are not available in sufficient quantities to satisfy any individual's wants.

2 are not available in sufficient quantities to satisfy all wants for them.

3 cannot be increased in quantity to any significant extent.

4 are of primary importance in satisfying the wants of society.

1.1.2 It has been said that the fundamental fact of scarcity is no longer applicable to the U.S. economy. This statement is

1 true, because the U.S. is one of the richest countries in the world.

2 true, because the resources that are scarce in the U.S. can be imported from abroad.

3 false, because not all the wants of all U.S. citizens are fully satisfied.

4 false, because a significant number of families in the U.S. have incomes below what is known as the poverty level.

1.1.3 Which of the following is correct?

A A free tyre with every four purchased is an example of a free good.

B Green Shield stamps with every gallon of petrol is an example of a free good.

C Fresh air in an air-conditioned building in Oxford Street is an example of a free good.

1 B only
2 B and C only
3 A, B and C
4 Neither A nor B nor C

1.1.4 To satisfy wants as fully as possible a society must

1 choose the best set of goods and services from all feasible sets.

2 produce various sets of goods and services then choose one set.

3 ensure that free goods are available to all members of society.

4 ensure that luxury goods are produced only when necessities are freely available to all.

1.1.5 Which of the following is correct?

An accurate definition of economics is:

A Economics studies how nations use scarce resources to produce the goods and services which satisfy wants as fully as possible.

B Economics studies how nations use goods and services to produce resources which people consume.

C Economics studies how free goods can be converted into economic goods using as few resources as possible.

1 A only
2 A and C only
3 B and C only
4 A, B and C

1.2.1 The fact that individuals' tastes and preferences differ implies that

1 no two individuals ever buy the same quantities of any given good in a given time period.

2 free exchange of goods and services can increase society's welfare without an increase in the quantities of goods and services available.

3 an individual's wants can never be fully satisfied until all a nation's resources are efficiently utilised.

4 a nation's wants can never be fully satisfied.

1.2.2 Two individuals who both had baskets containing oranges and apples were observed exchanging voluntarily 3 apples for 2 oranges. It can be concluded that:

1 There were more apples than oranges before the exchange in one individual's basket.

2 Both individuals benefited from the exchange.

3 One individual benefited more than the other from the exchange.

4 One individual prefers oranges to apples and the other prefers apples to oranges.

1.2.3 A given quantity of goods can be produced in a variety of ways using different amounts of two resources, A and B.

Method 1 uses 5 units of A and 10 units of B
Method 2 uses 10 units of A and 4 units of B
Method 3 uses 6 units of A and 4 units of B

Which of the following statements is coorect regarding engineering efficiency?

1 Method 2 is more efficient than method 1.

2 Method 3 is more efficient than method 2.

3 Method 3 is more efficient than method 2 and method 1.

4 Insufficient information exists to determine whether one method is more efficient than any other.

1.2.4 Which of the following correct?

A society which is capable of producing more goods and services in any given year compared to the previous, must

A /

A have access to superior productive techniques each year.

B have more resources available each year.

1 A only
2 B only
3 A or B or both A and B
4 Neither A nor B

1.2.5 Which of the following is correct?

An economy is operating in an economically efficient manner when

A goods and services are being produced using the least amount of resources.

B no individual's utility could be increased.

C society's wants are being satisfied as fully as possible.

1 A and B only
2 A and C only
3 A, B and C
4 B and C only

1.3.1 A government has completed a cost-benefit study showing that the annual value of the services from an additional 100 miles of motorway would be £4 million and the annual value of the services from an additional airport would £3 million. To achieve the most efficient use of resources the government should

1 construct only 75 miles of motorway (that is 3/4 of 100).

2 construct only the 100 miles of motorway.

3 construct both the 100 miles of motorway and the airport.

4 not necessarily construct either any additional motorway or the airport.

1.3.2 Which of the following is true?

In the present programme for the N.H.S. total benefits exceed total costs. The government should undertake an increase in expenditure on medical services only if

A the total benefit derived from all medical services still exceeds the total cost.

B the total benefit derived from all medical services still exceeds that of any other good.

C the benefit from the extra medical services outweighs the cost of doing with less of other goods.

1 A only
2 B and C only
3 C only
4 A, B and C

1.3.3 This question is based on the following statement:

"The problem facing the government is whether to build a new motorway system or to improve public transport throughout the country during the next three years. Resources for both projects are not available. It must be one or the other."

The opportunity cost of the new motorway system mentioned in the paragraph above is:-

1 greater than the economy can afford.

2 an improved public transport system.

3 the money required to pay for it.

4 the resources required to build it.

1.3.4 The following table shows the extra daily benefit and costs that would be derived from adding successive terminals at Heathrow airport in order to increase passenger handling capacity:

	Additional Capacity (Passengers)	Additional Benefits (£)	Additional Costs (£)
First terminal	1,000	45,000	40,000
Second terminal	1,000	35,000	25,000
Third terminal	1,000	25,000	20,000
Fourth terminal	1,000	15,000	18,000

How large an expansion programme should the airport undertake to maximise net benefit (total benefit minus total cost) and why?

1 Build one terminal since that provides the greatest marginal benefit.

2 Build two terminals since that is the level of expansion where the difference between marginal benefit and marginal cost is greatest.

3 Build three terminals since that is the largest number of new terminals for which marginal benefit exceeds marginal cost.

4 Build four terminals since the programme would involve the largest total benefit and the lowest marginal cost.

1.3.5 The opportunity cost of each successive year of a student's education is greater than it was the year before. For example, the sixth year a student is in school costs more than the fifth year did. One reason for this is that

1 each additional year of education requires sacrificing output that older, stronger, and better trained children could produce if they went to work.

2 each additional year of education adds to the wages or salary the student will get when he goes to work, and hence to the labour cost. Society must ultimately pay for output.

3 the longer students stay in school, the later they tend to marry and the fewer children they tend to have after they marry.

4 the increasing productivity of the better trained labour force must cause higher unemployment for the untrained.

1.4.1 Which, if any, of the following statements is correct?

A For centrally planned economies, since all members of the labour force are allocated jobs, scarcity is not a problem.

B For capitalist economies, since workers occasionally become unemployed, scarcity is not always a problem.

C For both centrally planned and market economies, since resources are insufficient to satisfy all wants, scarcity is a problem.

1 A only
2 B only
3 C only
4 None of the above

1.4.2 Which of the following statements is correct?

A What, how and for whom goods and services are produced are problems common to traditional, command and market economics.

B In traditional, command and market economies all land is owned privately but other resources may be privately and/or collectively owned.

C In traditional and command economies each individual receives the same amount of goods and services whereas in market economies individuals receive an amount of goods and services equivalent to the resources each owns.

1 A only
2 A and B only
3 A and C only
4 A, B and C

1.4.3 The fundamental economic problem of what, how and for whom to produce, can be tackled in three ways. Which of the following statements is correct?

A The command solution is economically efficient because it is possible to control prices.

B The traditional solution is economically efficient because prices are irrelevant.

C The market solution is economically efficient because prices keep on changing.

1 A only
2 B only
3 C only
4 Neither A nor B nor C

1.4.4 Which of the following statements is correct?

That all economies are mixed economies means that all economies

A engage in trade with one another.

B combine resources in different ways to produce the goods and services they want.

C face the fundamental problem of insufficient resources to satisfy all wants fully.

D use a combination of the traditional, the command and the market solutions.

1 A only
2 A and C
3 B and C
4 D only

1.4.5 Which, if any, of the following statements would be valid for any type of economic system?

A The opportunity cost of a unit of land is the value it would create when put to its best alternative use.

B The opportunity cost of a good is the value of the other goods that must be foregone in order to produce it.

1 A only
2 B only
3 Both A and B
4 Neither A not B

OBJECTIVE EXAMINATION QUESTIONS

MICRO UNIT 2

Answer Key:

2.1 The Concept of Demand

Q.2.1.1	(4)
Q. 2.1.2	(2)
Q.2.1.3	(4)
Q.2.1.4	(4)

2.2 Influences on Demand

Q.2.2.1	(2)
Q.2.2.2	(2)
Q.2.2.3	(2)
Q.2.2.4	(4)
Q.2.2.5	(4)

2.3 Assumptions in the Theory of Demand

Q.2.3.1	(1)
Q.2.3.2	(3)
Q.2.3.3	(4)
Q.2.3.4	(1)
Q.2.3.5	(1)
Q.2.3.6	(2)

2.4 Implications of the Assumptions

Q.2.4.1	(1)
Q.2.4.2	(2)
Q.2.4.3	(2)
Q.2.4.4	(3)
Q.2.4.5	(1)
Q.2.4.6	(1)

2.5 /

2.5 Individual Demand

Q.2.5.1	(2)
Q.2.5.2	(3)
Q.2.5.3	(4)
Q.2.5.4	(3)
Q.2.5.5	(3)
Q.2.5.6	(3)
Q.2.5.7	(4)
Q.2.5.8	(1)

2.6 Market Demand

Q.2.6.1	( )
Q.2.6.2	(3)
Q.2.6.3	(4)
Q.2.6.4	(3)
Q.2.6.5	(2)

2.7 Characteristics of Demand

Q.2.7.1	(3)
Q.2.7.2	(1)
Q.2.7.3	(1)
Q.2.7.4	(2)
Q.2.7.5	(3)
Q.2.7.6	(3)
Q.2.7.7	(2)
Q.2.7.8	(4)
Q.2.7.9	(2)

2.1.1 If a dictator were to take control of the British economy and decide which set of goods and services to produce, which of the following would necessarily be true?

A Not all resources would be fully utilised.

B Economic efficiency would not prevail

C No wants would be satisfied

1 A only
2 A and B only
3 A and C only
4 Neither A nor B nor C

2.1.2 Which of the following describes the concept of demand?

A How fully a good satisfies an individual's wants

B How much of a good an individual would be prepared to buy at different prices

1 A only
2 B only
3 A and B
4 Neither A nor B

2.1.3/

2.1.3 The amount of income which a student will allocate in any term to textbook purchases could depend upon which of the following?

A The ability of textbooks to satisfy the student's wishes

B The price of new textbooks

C The price of second hand textbooks

1 A only
2 A and C only
3 B and C only
4 A, B and C

2.1.4 A society producing only sandwiches and cups of coffee has resources capable of producing the following:

Sandwiches	Cups of Coffee
20,000	0
10,000	10,000
6,000	14,000
0	20,000

Which set of outputs will satisfy society's wants as fully as possible?

1 No single set is optimal

2 Any set is optimal as long as all of society's resources are being utilised

3 Either 10,000 sandwiches + 10,000 cups of coffee
or 6,000 sandwiches + 14,000 cups of coffee

4 Insufficient information exists to determine the optimal set of outputs

2.2.1 Which of the following is an example of a sumptuary law?

1 $e = mc^2$

2 Speed limit is 30 miles per hour

3 "Thou shalt have no other God before me"

4 The top 5% of the class receives 'A' grades

2.2.2 A traveller arrives at an airport and discovers that the taxi fare to the city is £5. Which of the following economic variables will influence the average individual's decision whether or not to hire a taxi?

A The price of the airport bus to the city

B The individual's income

C The price of a new taxi

1 B only
2 A and B only
3 A and C only
4 A and B and C

2.2.3 In some countries the sale of pornographic magazines is prohibited. Therefore it can be concluded that

1 in those countries no individual has any demand for such magazines

2 some people in those countries believe that the reading of such magazines is harmful to society

3 it is bad for people to read such magazines

4 individuals collectively in those countries have no demand for such magazines

2.2.4 A family emigrated from Britain to Australia, and in examining annual budgets discovered that it spent more on wine, recreation and housing and less on warm clothing, heating and lighting in Australia than it did in Britain.

Which of the following factors could have caused changes in the family's spending pattern?

A The prices of goods and services
B The income level of the family
C The length of time period being compared
D The values of Australian versus British society

1 A only
2 D only
3 A, B and C
4 A, B and D

2.2.5 If an individual were observed to buy none of a particular good at its existing price, which of the following could be concluded?

A The good is incapable of satisfying any of the individual's wants
B The individual expects the price to fall in the future

1 A only
2 B only
3 A or B but not both
4 Neither A nor B

2.3.1 Families usually shop carefully for a new car and a new washing machine but do not care which farmer grows the wheat for their daily bread.

In terms of the assumptions which underlie demand theory, which of the following accounts for this behaviour?

1 Wheat is perceived as a homogeneous good
2 In their major characteristics there is no real difference in cars of similar size
3 Washing machines are a homogeneous good
4 Since bread is cheap, people consume it until its marginal utility is zero.

2.3.2 In a two good world in which an individual's marginal utilities of both goods are greater than zero, which of the following statements must be true?

A As marginal utilities rise, total utility falls
B As marginal utilities rise, total utility rises
C As marginal utilities fall, total utility rises
D As marginal utilities fall, total utility falls

1 A only
2 C only
3 A and C only
4 B and D only

2.3.3 The following observations were made about two students' beer purchases in a year. In which of the following does the cet.par. assumption hold?

A Student A's purchases of beer vary widely from month to month

B Student B purchases the same quantity of beer every day

1 A only
2 B only
3 A and B
4 Neither A nor B

2.3.4 On a desert island, only two foods are available - fish and coconuts. Some days the castaway eats well; other days he is hungry.

Which of the following statements is true?

A On any given day, the higher the marginal utilities of fish and coconuts the hungrier he is

B On any given day, the lower the marginal utilities of fish and coconuts the hungrier he is

C On any given day, when the marginal utilities are zero, his total utility is zero

1 A only
2 B only
3 A and C only
4 B and C only

2.3.5 Consider an individual who consumes only two goods. In the time period immediately preceding the present time period, his marginal utilities were higher than their present level.

From this we can deduce that

1 he is definitely better off now than he was in the previous time period

2 he is definitely worse off now than he was in the previous time period

3 he is definitely worse off than he was only if his income has changed

4 he is definitely better off than he was only if prices have changed

2.3.6 In order to develop any economic theory, it is necessary to make certain assumptions. Which of the following is a necessary assumption in the development of the theory of demand?

1 Consumers' actions will affect the price of goods

2 Consumers attempt to gain maximum satisfaction from the spending of income

3 Consumers are subject to an increasing budget constraint over time

4 New products may enter the market in the time period under consideration

2.4.1 Which of the following statements is true if the price of rented accommodation falls, cet.par.?

A People in rented accommodation experience a rise in real income

B Home owners experience a rise in real income

1 A only
2 B only
3 A and B
4 Neither A nor B

2.4.2 A utility maximising individual in equilibrium buys hot dogs at 25p each and glasses of beer at 50p each. He derives 40 utils from the fourth and last hot dog he buys. How many utils does he derive from the last glass of beer he buys in the same time period?

1 20
2 40
3 80
4 160

2.4.3 An individual shifts to a new equilibrium position as a result of some change either in prices or in his money income. In his new equilibrium situation marginal utilities are all lower than they were in the old situation. This means that

1/

1 he is definitely worse off in his new equilibrium situation than in his old one

2 he is definitely better off in his new equilibrium situation than in his old one

3 he is worse off than in his old situation if his income has changed, but not otherwise

4 he is better off than in his old situation if prices have changed, but not otherwise

2.4.4 In a village in Ireland in the 19th century, all income was earned by producing linen and all family income was spent on food. When the price of meat fell, family A bought fewer potatoes and said it was better off. Family B said it was neither better nor worse off. Assuming the "law of diminishing marginal utility" to hold, which of the following must have been true?

A Family A's marginal utility of meat must have fallen

B Family B must not have consumed any meat either before or after the price change

1 A only
2 B only
3 A and B
4 Neither A nor B

2.4.5 An individual buys only wine and cheese. In spending all his income, his marginal utility of a bottle of wine is three and his marginal utility of a pound of cheese is one. The price of wine is £4 and the price of cheese is £2. If the individual wants to maximise his utility he should buy

1 more wine and less cheese
2 less wine and more cheese
3 all wine and no cheese
4 all cheese and no wine

2.4.6 Mr. Smith goes into a shop which is having a sale of cashmere sweaters. The offer is 1 sweater for £41, 2 sweaters for £80 and 3 for £96. Smith purchases 2 sweaters for £80.

Assuming Smith to be a utility maximising individual, which of the following can be inferred from his behaviour?

A The marginal utility of cashmere sweaters for Smith declines as purchases of cashmere sweaters increase
B The ratio of the marginal utility to the price of the second sweater is greater than the ratio of marginal utility to price of the third sweater
C Smith's failure to purchase the third sweater at a price to hime of £16 indicates that he has missed an opportunity to maximise utility.

1 A and B only
2 A and C only
3 A and B and C
4 B and C only

2.5.1 Which of the following is true with respect to an individual's demand curve?

1 The lower the price the greater the marginal utility of the good
2 Prices of all other goods are assumed to be constant
3 It will shift to the right if the price of the good falls
4 It indicates the going price of the good

2.5.2 A consumer's typical demand curve is downward sloping to the quantity axis for which of the following reasons?

A At lower prices the consumer buys more of the good in question in place of other goods which are now relatively more expensive
B At lower prices, the consumer can buy all he bought of the good at the higher prices and with the money left over buy still more

1 A only
2 B only
3 Both A and B
4 Neither A nor B

2.5.3 Which of the following could cause a shift in an individual's demand curve for beer?

A A change in the price of beer
B A change in the price of wine
C A change in the individual's income

1/

1 A only
2 A and B only
3 A and C only
4 B and C only

2.5.4 Which of the following reasons helps explain why the amount of a good demanded by an individual decreases as price increases?

A The individual substitutes relatively cheaper goods for the good whose price has risen
B The individual increases his purchase of the good because of expectations of further price increases
C The individual suffers a loss of real income

1 A only
2 A and B only
3 A and C only
4 A, B and C

2.5.5 An individual's demand for hamburgers is exemplified by which of the following?

1 The number of hamburgers purchased at a given price per week by the individual, cet.par.
2 The number of hamburgers purchased at each level of income per week by different individuals with similar characteristics, cet.par.
3 The number of hamburgers that would be purchased in a week at each price by the individual, cet.par.
4 The number of hamburgers purchased at different prices in a given week by the individual, cet.par.

2.5.6 Which of the following will not change a person's real income?

1 The price of one good drops while all other prices and the money income level remain constant.

2 Money income falls by half and the prices of all goods double

3 Money income doubles and the prices of all goods double

4 Money income doubles and the prices of all goods fall by half

2.5.7 Which of the following would not cause a shift in an individual's demand curve for peas?

1 An increase in income

2 An increase in the price of sweet corn

3 A decrease in the price of potatoes

4 A decrease in the price of peas

2.5.8 An individual's demand curve for any given commodity is most likely to shift to the right (or upward) with

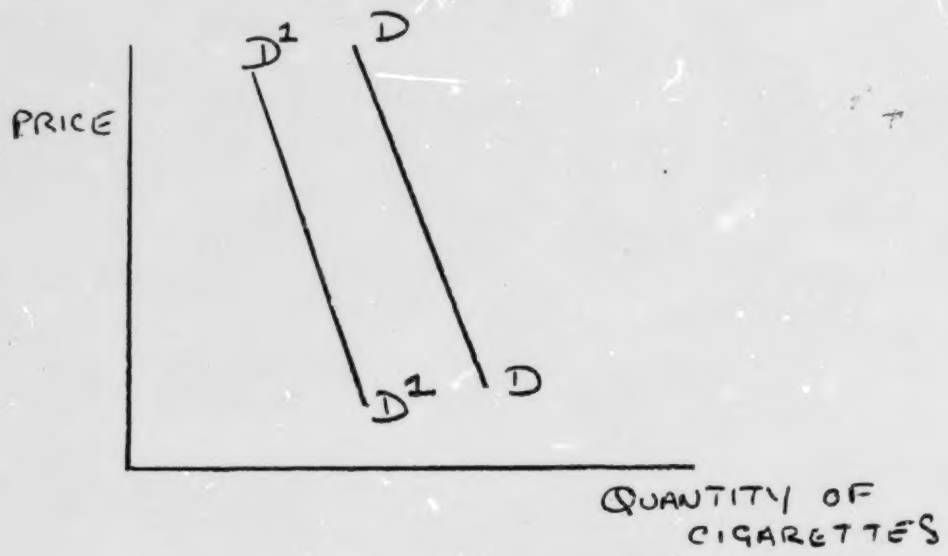
1 a rise in the price of substitutes, or a fall in the price of complements

2 a rise in the price of either substitutes or complements

3 a fall in the price of substitutes, or a rise in the price of complements

4 a fall in the price of either substitutes or complements

2.6.1



In the above diagram which of the following factors is likely to have caused the demand curve for cigarettes to shift from DD to D^1D^1?

A The B.M.A.'s Report suggesting a link between cigarette smoking and premature death

B A decrease in the price of cigars and pipe tobacco, cigar and pipe smoking being substitutes for cigarette smoking for many people

C An increase in smokers' incomes

1 A only
2 A and B only
3 A and C only
4 A, B and C

2.6.2 Which of the following factors will affect the market demand for a good but not an individual's demand for the good?

A The price of substitute goods
B The price of complementary goods
C The number of potential purchasers of the good

1 A only
2 B only
3 C only
4 A and B only

2.6.3 Which of the following is a complete and correct definition of the demand for commodity X?

1 The amount of X which would be bought at the prevailing price, assuming factors which could shift the demand curve remain the same during the period being considered
2 The amount of X which would be bought by people when their incomes change
3 The amount of money people would spend to purchase X as the price they must pay for it changes
4 The amounts of X that would be bought each period, at each price, assuming other factors influencing demand (income, tastes, etc.) remain constant

2.6.4 If beef is a substitute for lamb, and mint jelly is a complementary good to lamb, which of the following is correct?

An increase in the price of lamb, cet.par., will lead to

1 a decrease in the quantity of beef demanded
2 an increase in the quantity of beef demanded and an increase in the quantity of mint jelly demanded
3 a decrease in the quantity of mint jelly demanded
4 an increase in the quantity of mint jelly demanded and a decrease in the quantity of beef demanded

2.6.5 A family spends all its income on three goods - X, Y and Z. The price of Z increases while the prices of X and Y and family money income remain unchanged. If the quantity of X purchased increases and the quantity of Y purchased decreases which of the following is correct?

1 Z is an inferior good
2 X is a substitute for Z, Y a complement to Z
3 X is a complement to Z, Y a substitute for Z
4 X and Y are both complements to Z

2.7.1 Which of the following statements would be correct if the demand for the good in question were inelastic?

A Government sponsored agricultural research that increased acreage yields would lead to a decline in farmers' incomes

B Burning part of the coffee crop by the Brazilian government in years of supply would keep export earnings from falling

1 A only
2 B only
3 Both A and B
4 Neither A nor B

2.7.2 In travelling about a city, most people use either the underground or the bus. Suppose all underground fares were doubled, but bus fares remained unchanged. How would the underground fare increase affect the total fare revenue?

1 It would increase for buses but might increase or decrease for the underground
2 It would increase for the underground but might increase or decrease for buses
3 It would increase for both the underground and buses
4 It would increase for the underground and remain unchanged for buses

2.7.3 Several football teams are considering allowing persons 65 years of age or older to attend games for £0.50 instead of the usual £1.

If the gate receipts were to rise with the adoption of the proposed policy, which of the following statements must be true?

A As a group, older people would have as a result more income to spend on all other commodities

B The quantity of tickets bought by older persons is more responsive to changes in price than the quantity bought by younger persons

C The resulting increase in revenue from new fans would exceed the resulting loss in revenue from existing fans who would pay £0.50 instead of £1.

1 C only
2 A and B only
3 B and C only
4 A, B and C

2.7.4 Along a given downward-sloping straight line demand curve

1 elasticity is the same everywhere
2 elasticity is greater at high than at low prices
3 elasticity is less at high than at low prices
4 elasticity is never unity

2.7.5 Dairy farmers requested that the Milk Marketing Board approve an increase in the price of milk in order to increase revenue to overcome falling profits. The Board disapproved the increase and suggested that the farmers would obtain higher revenues if they reduced the price to increase sales. On which of the following points do the farmers and the Board disagree?

1 Whether a cut in price would increase sales
2 Whether at a given price an increase in sales would increase profits
3 How responsive sales would be to changes in price
4 How responsive costs would be to changes in output

2.7.6 The University Union operates so as to raise just enough revenue to cover its costs. Its revenue comes from a membership fee of £5 and a price of £0.50 for its nightly film in the main lounge. Attendance at the film results in overcrowding of the lounge. In order to reduce the crowding without increasing total receipts, if film demand is elastic and membership demand is inelastic, the Club should

1 raise both the membership fee and the film price
2 lower both the membership fee and the film price
3 raise the film price and lower the membership fee
4 lower the film price and raise the membership fee

2.7.7 As the price of a good increases, so too does the amount spent on it. Thus, it can be concluded that

1 the demand for the good is price elastic
2 the demand for the good is price inelastic
3 the demand for the good is income elastic
4 the demand for the good is income inelastic

2.7.8 If a consumer has budgeted a fixed amount of money to buy a certain commodity, and within a certain range of prices will spend neither more nor less than this amount on it, then his demand curve in this price range would properly be designated to be, with respect to price,

1 linear
2 perfectly elastic
3 perfectly inelastic
4 of unitary elasticity

2.7.9 "If its advocates are correct, the minimum wage bill passed this week by the House of Representatives would raise wages for nearly seven million underpaid workers over the next few years but would have no noticeable adverse effects on business, on employment, or on the price level." - The New York Times, May 29 1966, page 6E.

Which of the following is correct?

The quotation implies that the demand for the labour services of the seven million workers mentioned with respect to the price of labour services

A is elastic

B is inelastic

C has unit elasticity

1 A only
2 B only
3 C only
4 Either A or B or C

OBJECTIVE EXAMINATION QUESTIONS

MICRO UNIT 3

Answer Key:

3.1 The Concept of Supply

Q.3.1.1	(4)
Q.3.1.2	(2)
Q.3.1.3	(4)
Q.3.1.4	(2)
Q.3.1.5	(4)
Q.3.1.6	(4)
Q.3.1.7	(3)
Q.3.1.8	(4)
Q.3.1.9	(1)
Q.3.1.10	(4)

3.2 Identification of Variables

Q.3.2.1	(3)
Q.3.2.2	(4)
Q.3.2.3	(2)

3.3 Assumptions in the Theory of Supply

Q.3.3.1	(4)
Q.3.3.2	(4)
Q.3.3.3	(2)
Q.3.3.4	(4)
Q.3.3.5	(2)
Q.3.3.6	(4)
Q.3.3.7	(3)

3.4 Implications of the Assumptions

Q.3.4.1	(1)
Q.3.4.2	(2)
Q.3.4.3	(4)
Q.3.4.4	(4)

/

Q.3.4.5	(3)
Q.3.4.6	(2)
Q.3.4.7	(3)
Q.3.4.8	(2)
Q.3.4.9	(3)
Q.3.4.10	(2)
Q.3.4.11	(3)
Q.3.4.12	(2)
Q.3.4.13	(1)
Q.3.4.14	(4)
Q.3.4.15	(4)
Q.3.4.16	(4)
Q.3.4.17	(3)

3.5 Firm Supply in the Short Run

Q.3.5.1	(4)
Q.3.5.2	(2)
Q.3.5.3	(2)
Q.3.5.4	(3)
Q.3.5.5	(4)
Q.3.5.6	(4)
Q.3.5.7	(3)
Q.3.5.8	(4)
Q.3.5.9	(2)
Q.3.5.10	(1)
Q.3.5.11	(4)

3.6 The Theory of Supply : Industry Supply in the Short Run

Q.3.6.1	(4)
Q.3.6.2	(2)
Q.3.6.3	(2)

3.7 The Theory of Supply : Firm Supply in the Long Run

Q.3.7.1	(4)
Q.3.7.2	(3)
Q.3.7.3	(3)
Q.3.7.4	(1)

3.8/

3.8 The Theory of Supply : Long Run Industry Supply

Q.3.8.1	(4)
Q.3.8.2	(2)
Q.3.8.3	(3)
Q.3.8.4	(3)

3.9 Characteristics of Supply

Q.3.9.1	(4)
Q.3.9.2	(2)
Q.3.9.3	(1)

3.1.1 The economy of Mythica is not producing its maximum output of goods and services. Which of the following statements is correct?

A Goods are not being produced in an engineering efficient manner but all resources are employed in production

B Goods are being produced in an engineering efficient manner but not all resources are employed in production

C Goods are not being produced in an engineering efficient manner and not all resources are employed in production

1 A only
2 B only
3 A or B only
4 A or B or C

3.1.2 If all resources in an economy are employed and if all goods and services are produced in an engineering efficient manner, which of the following statements is correct?

A Consumers' utility is at a maximum

B Total output of goods and services is at a maximum

1 A only
2 B only
3 A and B
4 Neither A nor B

3.1.3/

3.1.3 Which of the following is correct?

Economic efficiency is achieved in an economy when

A society's wants are satisfied as fully as possible

B all goods and services are produced using the least possible inputs of resources

C all resources are employed

1 C only
2 A and B only
3 B and C only
4 A and B and C

3.1.4 When one good is being produced using the minimum amount of resources

1 economic efficiency will prevail in the economy as a whole

2 engineering efficiency will prevail in the production of that good

3 all resources in the economy will be employed

4 an increase in the production of that good must lead to a reduction in the production of other goods

3.1.5 If a dictator were to take control of an economy and decide which set of goods and services to produce, which of the following would necessarily be true?

A/

A Not all resources would be fully utilised

B Economic efficiency would not prevail

C Goods would not be produced in an engineering efficient fashion

1 A only
2 A and B only
3 A and C only
4 Neither A nor B nor C

3.1.6 An economy currently produces 100 units of food, 100 units of housing, and 100 units of clothing per day. This output is below its production frontier.

If the economy increased its output of food per day, it would have to decrease its output of

A clothing

B housing

1 A only
2 B only
3 A or B or both A and B
4 Neither A nor B

3.1.7/

3.1.7 The term 'market supply of a good' means

1 the various amounts of that good sold at different times and at different prices by all firms in the market
2 the total number of firms in the market which produce that good in a given time period
3 the amounts of that good which would be produced by firms in the market at different prices in a given time period
4 the amount of that good that would have to be produced in a given time period in order to satisfy the market demand for it

3.1.8 Which of the following is a correct definition of the market supply of a good?

A The quantities of the good which a firm would be willing to produce at different prices
B The quantities of the good that people would be willing to buy at different prices

1 A only
2 B only
3 Both A and B
4 Neither A nor B

3.1.9/

3.1.9 If the London Symphony Orchestra were giving a concert in the Albert Hall, and if admission were free, which of the following must be true?

A Both labour and capital services are being employed to produce the concert

B No resources are being employed since admission to the concert is free

C Land is the only resource being employed since the Albert Hall has many alternative uses

1 A only
2 B only
3 A and C only
4 B and C only

3.1.10 Which of the following determines the supply of labour services in an economy?

A The quantity and quality of capital in the economy

B The demands for labour by firms

1 A only
2 B only
3 A and B
4 Neither A nor B

3.2.1 A country is concerned about the spread of pornographic material and passes a law to prohibit its sale. Despite severe penalties on suppliers, some pornography is still sold through underground bookshops and mail order catalogues.

Which of the following is true?

A Sales revenues to suppliers will increase

B The moral values of the country expressed through its laws influence the quantity of pornographic material sold

C Economic variables continue to influence the supply of pornographic materials

1 A only
2 A and B only
3 B and C only
4 Neither A nor B nor C

3.2.2 If you were to observe a firm supplying none of a particular good at its existing price, which of the following could justifiably be concluded?

A The good is incapable of making a profit for the firm at any price

B The firm expects the price to fall in the future

1/

1 A only
2 B only
3 Both A and B
4 Neither A nor B

3.2.3 A firm which produces a range of cosmetic products moves from Britain to West Germany. In comparing monthly sales, it discovers that, in West Germany, it supplies a greater proportion of high cost items than it did in Britain. Which of the following factors has not caused the change in the firm's sales?

A Higher income levels in West Germany
B Length of the period being compared
C Prices of different cosmetic products

1 A only
2 B only
3 B and C only
4 A, B and C

3.3.1 The correct definition of the term "short run" as used in the theory of supply is

1 the time period between the decision to produce a good and its final appearance on the market
2 a time period of less than 1 year in which more than one factor of production can be altered
3 a time period of up to 3 years in which any factor of production can be altered
4 the time period in which a firm cannot increase or decrease the quantity it hires of at least one factor of production

3.3.2 In the theory of supply, the term "long run" used in connection with a firm's decision making refers to

1 the number of years over which a firm can expect to produce with unaltered factors of production
2 any period of time between 3 and 5 years in which a firm can increase or decrease all the factors of production it employs
3 any period of time over 5 years in which a firm can increase or decrease all the factors of production it employs
4 the time period in which a firm can increase or decrease all the factors of production it employs

3.3.3 The economic analysis of supply is partly based on a two-factor model of production using labour and capital. This model is used because

1/

1 only these two factors of production are necessary for production to take place

2 it is a convenient simplification which aids the development of theory

3 all factors of production can be classified as either labour or capital

4 no other model of production is possible

3.3.4 The following observations were made about 2 firms' supply of beer in a year. In which of the following can it be concluded that the cet.par. assumptions hold?

A Firm A offers for sale widely varying amounts from month to month

B Firm B offers for sale the same quantity of beer every day

1 A only
2 B only
3 A and B
4 Neither A nor B

3.3.5 In order to develop any economic theory, it is necessary to make certain assumptions. Which of the following is a necessary assumption in the development of the theory of supply?

1 Firms' actions will affect the price of goods

2/

2 Firms' attempts to gain maximum profit from the sales of their product

3 Firms are subject to increasing costs over time

4 New firms may enter the market in the time period under consideration

3.3.6 A firm must make maximum profits when

A it raises the maximum amount of revenue from selling its produce

B its products are produced at the lowest possible cost per unit of output

1 A only
2 B only
3 Both A and B
4 Neither A nor B

3.3.7 A farmer decides to stop producing crops on his farm to turn his fields into a golf course In terms of the profit maximizing theory of supply, economists would assume that

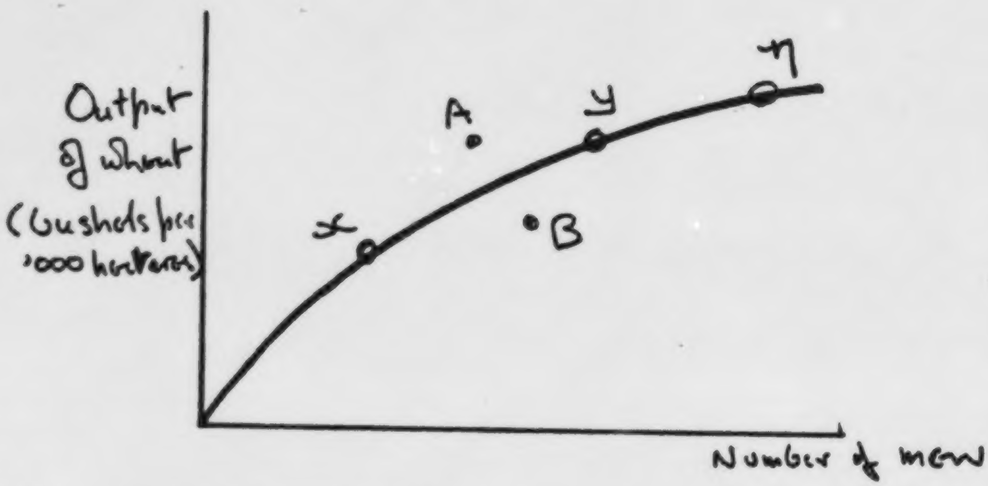
1 the farmer has become a keen golfer

2 there is no profit in agriculture

3 the farmer expected greater profits from golf than crops

4 the opportunity cost of the farm is the income he receives from growing crops

3.4 Questions 3.4.1 and 3.4.2 are based on the diagram below.



3.4.1 Which of the following is correct?

A The diagram provides information about engineering inefficient outputs

B The diagram provides information about economic efficiency since wheat is always in demand because of world food shortages

1 A only
2 B only
3 A and B
4 Neither A nor B

3.4.2 Which of the following statements is correct?

A Points X, Y and Z are the only attainable outputs

B B is an attainable output

C A is an unattainable output even in the long run

1/

1 A only
2 B only
3 C only
4 Neither A nor B nor C

3.4.3 Which of the following events will cause a shift in a firm's production frontier?

A Full time working by a previously underemployed workforce
B Research findings indicating new and more effective ways of combining the factors of production
C A training course for workers resulting in a more highly skilled workforce

1 A only
2 A and B
3 B and C
4 A and B and C

3.4.4 In the table below, which of the outputs may be regarded as conforming to the normal pattern expected when additional units of a variable factor of production are added to a fixed factor of production?

Unit/

Units of Capital	Units of Labour	Units of Output A	 B	 C	 D
1	1	1	1	4	1
1	2	2	1	3	4
1	3	3	1	2	9
1	4	4	1	5	12
1	5	5	1	11	13

1 A

2 B

3 C

4 D

3.4.5 A necessary but not sufficient condition for a firm to maximise profits is that

1 it sells its maximum possible output

2 its total costs of production are mimimum

3 its output is produced in an engineering efficient manner

4 demand for its product increases over time

3.4.6 The maximum output which can be produced by a machine is 100 units per hour when operated by one man or 250 units per hour when operated by two men. Which of the following is correct?

A Engineering efficiency requires that 2 men are employed in the operation of the machine

B An output of 100 or 250 units is possible but neither is necessarily economically efficient

1/

1 A only
2 B only
3 A and B
4 Neither A nor B

3.4.7 A hop grower in Kent noted that within limits the larger the number of workers he hired the greater was the output of hops from his fields. This means that for the number of workers being employed by the grower the marginal product of labour is necessarily

1 higher than the average product of farm labour
2 lower than the average product of farm labour
3 greater than zero
4 less than zero

3.4.8 Total output divided by the number of units of a variable factor used is a definition of

1 marginal product of that factor
2 average product of that factor
3 real cost of production
4 variable cost of production

3.4.9 A certain wheat farmer is producing 200 bushels of wheat per year, using 1000 man-hours. He adds one man-hour and is able to raise output to 210. Then marginal product of man-hours is

1/

1 210 bushels

2 200/1000 = .2 bushels

3 10 bushels

4 .01 bushels

3.4.10 The best of the following definitions of "marginal cost" is

1 the value of alternative goods whose production is foregone in order to use resources for producing this good

2 the addition to total cost involved in expanding output by one unit

3 total cost divided by the number of units produced

4 cost which does not vary with the level of output

3.4.11 A farmer wishing to maximise profit will always hire a factor of production as long as the value of its marginal product

1 is greater than zero

2 exceeds its average product

3 is greater than its cost

4 is less than zero

3.4.12 Cet.par. (other things remaining the same), the higher the marginal product of a factor input

1/

1 the higher the marginal cost of output

2 the lower the marginal cost of output

3 the lower the marginal product of the other factor inputs

4 the lower the average product of that factor

3.4.13 A recent economics graduate was hired by a highly competitive restaurant and was assigned the task of improving efficiency in the restaurant. It was felt that a non-optimum combination of two variable factor inputs was being employed. The economist was able to make the following calculations:

	Marginal Product	Cost per Unit of Factor Input
Factor A	6 lunches	£ 3.00
Factor B	3 lunches	£ 1.00

(Each lunch sells for £2.00)

The economist correctly diagnosed the problem and advised the restaurant owner on the appropriate course of action. That course was to

1 hire more A and more B

2 hire more A but no more B

3 hire more B but no more A

4 hire less B and less A

3.4.14 Which of the following is correct?

If marginal cost exceeds average total cost, then

1/

1 average total cost must be falling

2 average fixed cost must be rising

3 average variable cost must be falling

4 average total cost must be rising

3.4.15 Which of the following is correct?

At the quantity of output where average cost has reached its minimum level

1 average variable cost will equal fixed cost

2 average variable cost must be at its minimum level

3 marginal cost will equal average variable cost

4 marginal cost will equal average cost

3.4.16 Which of the following is correct?

If the total cost of producing 10 units is £100 and the marginal cost of the eleventh unit is £21, then

1 total variable costs of 11 units are £121

2 total fixed costs are £79

3 the marginal cost of the tenth unit is more than £21

4 the average total cost of 11 units is £11

3.4.17/

3.4.17 Which of the following is true?

A The higher the marginal product of a factor input, the lower the marginal cost of output

B The higher the average product of a factor input, the lower the average cost of output

C The higher the costs of fixed factor inputs, the lower the marginal cost of output

1 A only
2 C only
3 A and B only
4 A, B and C

3.5.1 For a firm with given plant and equipment, which of the following will always decrease as output increases?

1 Total variable cost
2 Total fixed cost
3 Variable cost per unit
4 Fixed cost per unit

3.5.2 In one of the largest manufacturing firms in Britain, an agreement was reached recently between management and unions that wage rates would increase proportionately with average labour productivity. Last year the firm increased its plant and equipment, retained all of its labour force fully employed and enjoyed a 6% increase in output. The unions have gone on strike because management has refused to pay any wage increase. According to the agreement which of the following is correct?

1 The unions should not receive a wage increase because the 6% increase in output is attributable to the increase in plant and equipment
2 The unions should receive a wage increase because average labour productivity has increased
3 The unions should receive a wage increase only if the firm increases its plant and equipment by less than 6%
4 Whether the unions should receive an increase according to the agreement cannot be determined from the given information

3.5.3/

Questions 3.5.3 and 3.5.4 are based on the following data which are for a raspberry grower who can hire labour to pick his fruit for £12 per picker per day.

Number of pickers	Raspberry output
1	£ 30
2	48
3	62
4	72
5	80
6	87
7	93
8	96
9	98
10	98

3.5.3 Which of the following is correct?

The profit maximising farmer should hire only

1 one raspberry picker because his contribution to output is greatest

2 three raspberry pickers because the fourth costs more than he earns

3 eight raspberry pickers because costs will equal revenue

4 nine raspberry pickers because the value of the marginal product of the tenth is zero

3.5.4 The government, in an attempt to improve the lot of the low-paid, passes a mimimum wage law which makes payment of less than £16 per day an offence. If the profit-maximising grower complies with the law, which of the following will be correct?

A/

A Each of the raspberry pickers the farmer had previously hired will become better off

B The value of the average product of labour will fall

C The quantity of raspberries picked will fall

1 A only
2 B and C only
3 C only
4 A, B and C

3.5.5 Which of the following is correct?

To maximise its profits, a firm should

A produce at the output level that will maximise its revenues, and produce that output at the lowest possible cost

B produce at the output that will minimise average cost, and sell that output for as high a price as possible

C produce at the output that will minimise marginal cost, and sell that output at as high a price as possible

1 A only
2 C only
3 A and B only
4 Neither A nor B nor C

3.5.6/

3.5.6 Which of the following is correct?

A firm that wants to maximise profits should produce the output at which

1 the excess of marginal revenue over marginal cost is greatest
2 the slope of the marginal revenue and marginal cost curves is the same
3 marginal cost is minimum
4 marginal cost equals marginal revenue

Questions 3.5.7 and 3.5.8 are based on the following information.

During a summer vacation a student rented a small factory including equipment for £400, which was not repayable. A large London shop promised to buy all the suede leather suits he could produce for £100 each. Not including the £400 rent he had already paid, he discovered he could produce the suits according to the following schedule:

Number of suits that could be produced during the summer	Average variable cost (pounds per suit)
4	90.00
5	80.00
6	70.00
7	65.00
8	67.50
9	70.00
10	73.00
11	80.00
12	100.00

3.5.7/

3.5.7 How many suits should he produce in order to maximise profit (minimise loss)?

1 0 suits

2 7 suits

3 9 suits

4 12 suits

3.5.8 After renting the factory and determining the profit-maximising number of suits to produce, the student was offered a research appointment by his economics professor. If each job were equally attractive in non-pecuniary aspects and if the student wanted to earn as much money as possible during his summer vacation, how much would he have to receive from his professor to be just as well off as he would be by producing suede suits?

1 £0

2 £130

3 £155

4 £270

3.5.9 A family will be away from its house for six months. The monthly mortgage payment on the house is £130. The local services, to be paid by the owner, cost £30 per month if the house is occupied; otherwise 0. If the family wishes to minimise its losses (or maximise/

maximise its gains) from the house, it should rent for as much as the market will bear as long as monthly rent is above the following: (Assume wear and tear, etc., to be be zero whether or not the house is occupied.)

1 £0

2 £30

3 £130

4 £160

Questions 3.5.10 and 3.5.11 are based on the following data:

At its present level of output of 400 units, a competitive firm discovers that its marginal cost is £4. At an output level of 300 units, marginal cost is £3 and is equal to average total cost. The price of the commodity being produced is £5.

3.5.10 If the firm wishes to maximise profit, which of the following should it do?

1 Increase output

2 Decrease output

3 Raise price

4 Lower price

3.5.11/

3.5.11 How much would a four hundred and first unit of output add to profit?

1 £5

2 £4

3 £3

4 £1

3.6.1 The short run supply curve of a competitive firm is

1 the rising segment of its short run marginal cost curve
2 the rising segment of its short run average variable cost curve
3 the rising segment of its short run average fixed cost curve
4 the rising segment of its short run marginal cost curve above its average variable cost curve

3.6.2 Which of the following could cause the short run supply curve of an industry to shift to the right?

A An increase in the number of firms in the industry
B An increase in the cost of the variable factor of production
C A decrease in the cost of the variable factor of production

1 A only
2 C only
3 A and C only
4 A, B and C

3.6.3 Assume that the U.S. agricultural industry is perfectly competitive. Further assume that improved relations with U.S.S.R. have led to a promise of large annual wheat sales and shipments to the U.S.S.R. for the foreseeable future, commencing immediately.

In the short run, which of the following will occur assuming the price of wheat rises?

A/

A More factor inputs will be employed in the agricultural industry

B Farmers' profits will increase

C Land now devoted to other crops will be switched to wheat production

1 A only
2 A and B only
3 A and C only
4 A, B and C

3.7.1 Which of the following is correct?

For a firm in the long run

1 fixed costs tend to be greater than variable costs

2 variable costs tend to be greater than fixed costs

3 all costs are fixed costs

4 all costs are variable costs

3.7.2 Which of the following is correct?

For all points on a firm's long run supply curve

A the firm is producing in an engineering efficient fashion

B increases in output are associated with increases in average costs

C increases in output are associated with increases in total costs

1 A only
2 B only
3 A and C only
4 Neither A nor B nor C

3.7.3 Which of the following is correct?

If a firm is maximising profit in the long run, price equals

A/

A short run marginal cost

B long run marginal cost

1 A only
2 B only
3 A and B
4 Neither A nor B

3.7.4 Which of the following would cause a firm's long run supply curve to shift to the left?

1 An increase in the costs of factor inputs
2 A decrease in the costs of factor inputs
3 Discovery of more efficient production methods
4 A decrease in the price of the good being produced

3.8.1 Which of the following is correct?

The long run supply curve of a competitive industry is found by adding

A the long run marginal cost curves of all firms in the industry

B the long run marginal cost curves above the average cost curves of all firms in the industry

C the long run average cost curves of all firms in the industry

1 A only
2 B only
3 C only
4 Neither A nor B nor C

3.8.2 Which of the following is correct?

If in a highly competitive British industry a reduction in international tariffs led to substantial imports arriving from abroad and to a fall in the price of the goods in question, other things unchanged,

A in the short run some domestic firms would go out of business

B in the long run some domestic firms would go out of business

C in the short run fewer domestic resources would be employed in the industry

1 A and B only
2 B and C only
3 A and C only
4 A, B and C

3.8.3/

3.8.3 If an increase in the demand for aircraft causes the price of aluminium to rise, how will this, other things unchanged, affect the industry which produces aluminium beer cans?

1 Its output will increase
2 Its long run supply curve will shift to the right
3 Its long run supply curve will shift to the left
4 Its long run supply curve will not be affected

3.8.4 Which of the following is correct?

At every point on the long run supply curve of a competitive industry

A price equals minimum average cost for each firm
B price equals marginal cost for each firm
C marginal cost equals minimum average cost for each firm

1 A only
2 B and C only
3 A, B and C
4 Neither A nor B nor C

3.9.1 Which of the following is correct?

If a firm is producing output at a point where diminishing returns have set in

A each additional unit of output will be more expensive to produce

B each additional unit of output will require increasing amounts of the factor of production being increased

C the marginal product of the variable factor of production decreases as the quantity used increases

1 A only
2 A and B only
3 B and C only
4 A, B and C

3.9.2 Which of the following is correct?

The term "increasing-cost" industry refers to an industry

1 whose fixed costs exceed its variable costs
2 whose long run supply curve slopes up to the right
3 whose short run marginal costs are rising
4 that raises its prices if costs go up

3.9.3/

3.9.3 Which of the following is correct?

Elasticity of market supply

1 becomes greater with the length of time being considered

2 is equal to elasticity of demand for the same product

3 is unitary in a competitive market

4 becomes less with the length of time being considered

MICRO UNIT 4

Objective Examination Questions

Answer Key:

4.1 The Concept of a Market

4.1.1	(4)
4.1.2	(2)
4.1.3	(2)

4.2 Market Supply and Demand

4.2.1	(3)
4.2.2	(2)
4.2.3	(4)
4.2.4	(3)
4.2.5	(2)

4.3 The Operation of Markets

4.3.1	(2)
4.3.2	(4)
4.3.3	(3)
4.3.4	(2)
4.3.5	(1)
4.3.6	(2)

4.4 Changes in Market Equilibrium

4.4.1	(1)
4.4.2	(4)
4.4.3	(2)
4.4.4	(1)
4.4.5	(2)

4.5 Intervention in the Market

4.5.1	(2)
4.5.2	(4)
4.5.3	(3)
4.5.4	(3)
4.5.5	(4)
4.5.6	(2)

4.6 Dynamic Adjustments in the Market

4.6.1	(3)
4.6.2	(3)
4.6.3	(1)

4.1.1 Which of the following is correct?

A market for a good, service, or resource exists when

1 there is a specific location where trade can take place.

2 individuals have something which they can sell.

3 individuals wish to buy something.

4 potential buyers are in communication with potential sellers.

4.1.2 Which of the following is the function of markets?

1 To ensure an equal distribution of goods and services.

2 To equate quantities supplied and demanded.

3 To ensure that all industries will be perfectly competitive in the long run.

4 To equate the marginal utilities of all goods consumed.

4.1.3 In a local fruit bazaar a number of traders have a supply of pineapples which they are prepared to sell to the general public at a range of prices. At the start of the day, the price sought by the traders is relatively high and none of the potential buyers who visit the stalls decides to buy pineapples. During the day the traders offer the pineapples at successively lower prices, but at the end of the day no pineapples have been sold and the traders invite the public to take the pineapples for nothing. Within ten minutes no pineapples remain.

Which of the following is correct?

It can be concluded that within the bazaar a market for pineapples

1 did not exist since no pineapples were bought and sold.

2 existed even though no pineapples were exchanged for cash.

3 did not exist because suppliers set their prices too high.

4 did not exist because consumers were not interested in buying pineapples at positive prices.

Questions 4.2.1, 4.2.2, and 4.2.3 are based on the data below which represent hypothetical demand and supply schedules for milkshakes in a US town.

Price (c)	Quantity Demanded per Week ('000)	Quantity Supplied per Week ('000)
10	180	0
20	160	40
30	140	80
40	120	120
50	100	160
60	80	200
70	60	240
80	40	280
90	20	320
100	0	360

4.2.1 Which of the following is correct?

A At all prices less than 40c excess demand exists.

B At all prices greater than 40c excess demand exists.

C At 40c excess demand and excess supply are both zero.

1 A only
2 C only
3 A and C only
4 B and C only

4.2.2 Which of the following statements would be correct if all stores were to set the price of milkshakes at 30c?

A Excess demand of 60,000 milkshakes would exist.

B No exchange would be possible since more milkshakes are demanded than producers are willing to supply.

C Consumers would be able to obtain 80,000 milkshakes per week.

1 A only
2 A and C only
3 B and C only
4 A, B, and C

4.2.3 If the price of milkshakes were set at 60c, which of the following would be correct?

A The demand curve for milkshakes would shift until a price of 40c were reached, where the market would be in equilibrium.

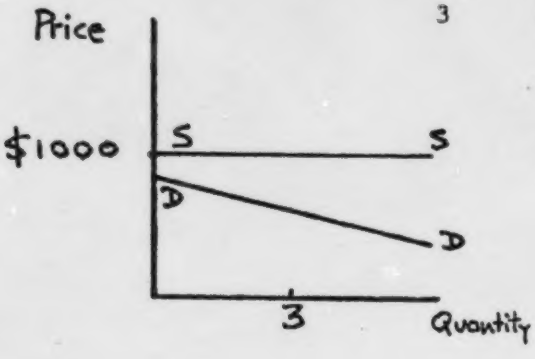
B The supply curve for milkshakes would shift until a price of 40c were reached, where the market would be in equilibrium.

1 A only
2 B only
3 Both A and B
4 Neither A nor B

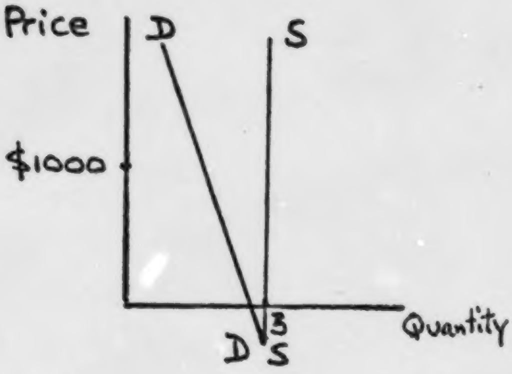
4.2.4 A local store deals in second hand musical instruments. It offered three pianos for sale at $1,000 each, but nobody wished to buy the pianos at that price. Over a period of months the store manager gradually reduced the asking price for the pianos but he was still unable to find buyers. Eventually, a representative of a music and drama college called at the store and offered to take the pianos at zero price on condition that the store paid the college for their removal. The store manager agreed.

Which of the following diagrams represents the market for the pianos?

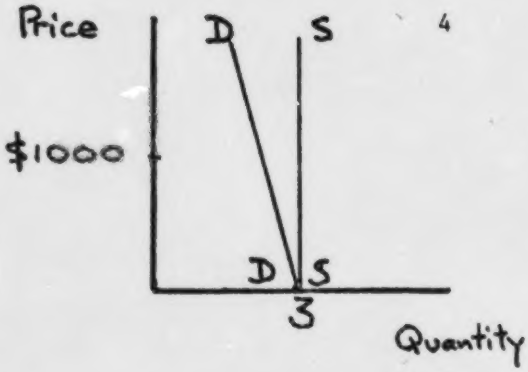
1


Price
$1000
S
S
D
D
3
Quantity

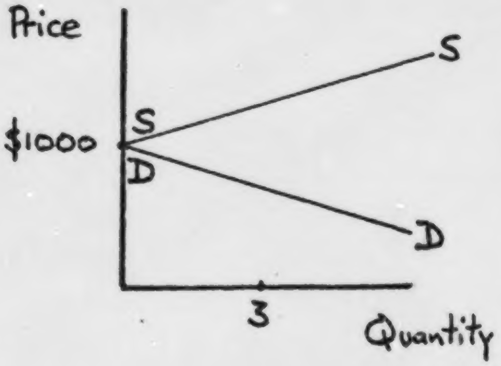
3


Price
D
S
$1000
3
D
S
Quantity

2


Price
D
S
$1000
D
S
3
Quantity

4


Price
S
$1000
S
D
D
3
Quantity

4.2.5 Suppose the market for a newly developed gold-plated pencil were represented by the demand and supply schedules below.

Price ($)	Quantity Demanded per Day	Quantity Supplied per Day
600	0	1000
500	0	700
400	0	350
300	0	0
250	0	0
200	50	0
150	100	0
100	150	0
50	250	0

Which of the following is correct?

1 Equilibrium quantity would lie between 50 and 350 pencils per day.

2 No exchange would occur.

3 Suppliers would have to lower their prices to $200 since that is the maximum price consumers are willing to pay.

4 Consumers would have to pay $400 to obtain pencils since that is the minimum price at which suppliers are prepared to sell.

4.3.1 The price system reacts to excess demand for a good in the short run by

1 lowering the price and profits of firms producing the good.

2 raising the price and producer profits.

3 lowering the price but increasing producer profits.

4 raising the price but lowering producer profits.

4.3.2 When influenza vaccine first became available in the US, the government set the price equal to the cost of production. At that price, output was insufficient to fill orders, and the government regulated the distribution of the vaccine. Had the vaccine been sold privately without government intervention,

1 the price would have been higher

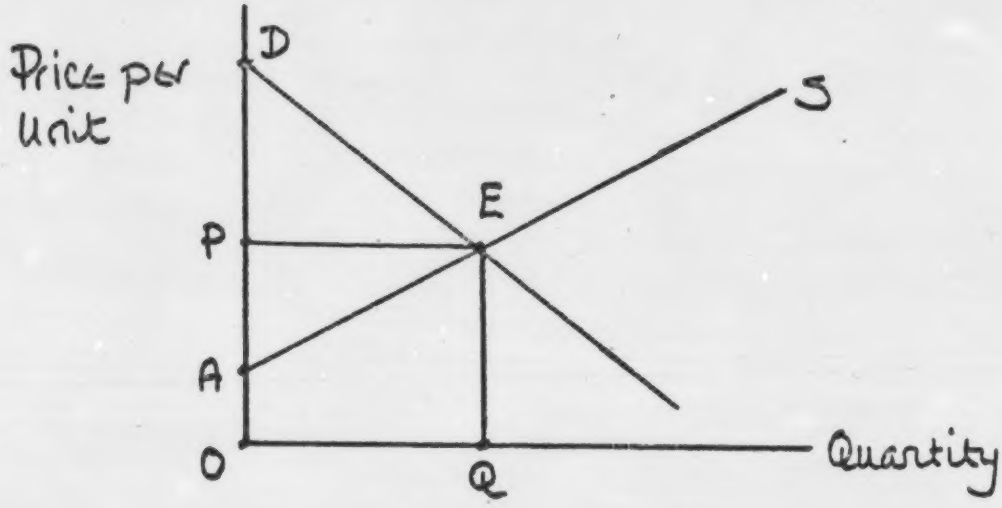
2 the price would have been lower

3 the price would have been the same.

4 whether the price would have been higher or lower cannot be determined from the information given.

Questions 4.3.3 and 4.3.4 are based on the diagram below.

Suppose the market for a good is represented by the demand and supply curves shown.



4.3.3 Which of the following areas measure consumer surplus when the price is OP per unit?

1 DEA

2 DOQE

3 DPE

4 PAE

4.3.4 Which of the following areas measures producer surplus when the price is OP per unit?

1 AOQE

2 PAE

3 POQE

4 DPE

4.3.5 "If excess demand for a good exists at a given price, the price of the good will rise. This price increase has two effects: it tends to shift the demand curve down because people are willing to buy a smaller quantity at a higher price, and it tends to shift the supply curve upwards because producers find it profitable to produce a greater output at a higher price. The price will adjust until there is no excess demand."

Which of the following is correct?

1 The quotation confuses shifts in curves with movements along curves.

2 The quotation is free of logical error, but it does not describe the way prices behave in actual, competitive markets.

3 The quotation would be correct if 'excess supply' were substituted for 'excess demand'.

4 The analysis in the quotation is correct.

4.3.6 If the equilibrium price prevails in the market for a good

A no consumers would buy units of the good if the price were higher.

B excess demand and excess supply are both zero.

C no producers would sell units of the good if the price were lower.

Which of the following is correct?

1 A only
2 B only
3 A and C only
4 A, B, and C

4.4.1 A city has decided to build 5,000 dwelling units and to lease them to low income persons at a rental below cost and the going rate in the private market. Other things, such as population, being the same, what effect would you expect this to have on the market for private housing?

1 A decrease in rent, followed later by a decrease in the quantity supplied.

2 A decrease in tenants followed later by an increase in rents.

3 An increase in rents followed later by an increase in the quantity supplied.

4 No effect, because the poor persons who will be eligible for the 5,000 city built dwelling units cannot afford acceptable private housing.

4.4.2 Which of the following is correct?

Assuming that the equilibrium price and equilibrium quantity prevail in the market for pork chops, a significant decrease in the price of lamb chops would tend to

1 increase the equilibrium price and decrease the equilibrium quantity of pork chops.

2 increase the equilibrium price and increase the equilibrium quantity of pork chops.

3 decrease the equilibrium price and increase the equilibrium quantity of pork chops.

4 decrease the equilibrium price and decrease the equilibrium quantity of pork chops.

4.4.3 Suppose the market for tomatoes were initially in equilibrium, but that costs of production for every supplier were to rise as a result of a significant increase in wages paid to all workers in the industry.

Which of the following statements is correct?

1 Both the equilibrium price and the equilibrium quantity of tomatoes would fall.

2 The equilibrium price of tomatoes would rise and the equilibrium quantity would fall.

3 The equilibrium price of tomatoes would fall and the equilibrium quantity would increase.

4 Both the equilibrium price and the equilibrium quantity of tomatoes would increase.

4.4.4 Suppose the market for golf clubs were initially in equilibrium. If there were a considerable increase in the number of people wishing to play golf and, simultaneously, a decrease in every golf club manufacturer's production costs due to the use of a new metal compound, which of the following statements would be correct?

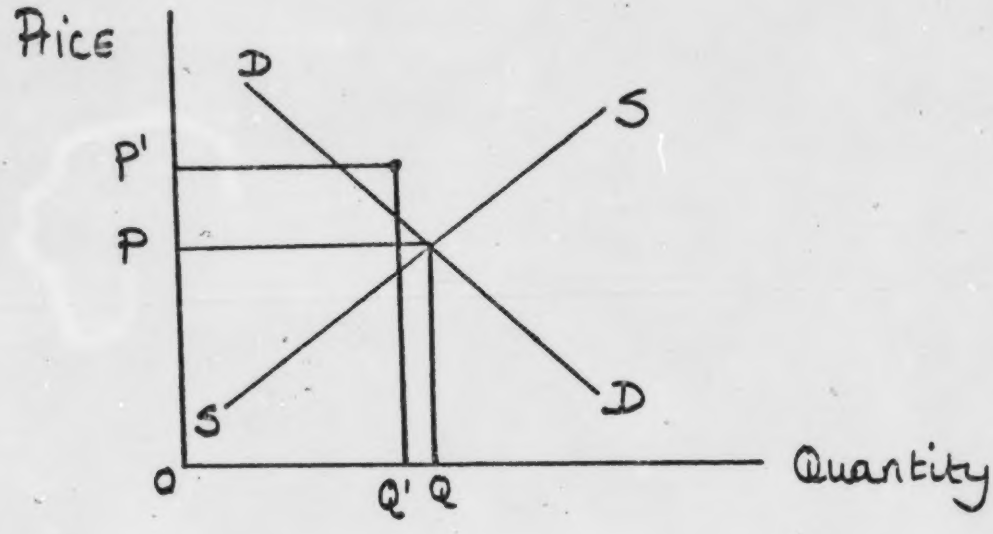
1 The equilibrium price of golf clubs might rise, fall, or remain at the same level, but the equilibrium quantity would increase.

2 The equilibrium price of golf clubs would rise, but the equilibrium quantity might increase, decrease, or remain at the same level.

3 The equilibrium price of golf clubs would fall, and the equilibrium quantity would increase.

4 The equilibrium price of golf clubs would fall, but the equilibrium quantity might increase, decrease, or remain at the same level.

4.4.5 Suppose that the market for a good were intially in equilibrium with the price OP and quantity bought and sold OQ, as shown in the diagram below. As a result of a change in both demand conditions and supply conditions, assume that the equilibrium price would rise to OP^1 and that the equilibrium quantity would fall to OQ^1.



To cause such changes, which of the following must have occurred?

1 An increase in demand and an increase in supply.

2 An increase in demand and a decrease in supply.

3 A decrease in demand and a decrease in supply.

4 A decrease in demand and an increase in supply.

4.5.1 In certain years the US government regulated the price at which certain agricultural crops could be bought and sold. As a result, the quantity of crops which individuals were willing to buy was less than the quantity which farmers were prepared to sell.

Which of the following is correct?

The price fixed by the government was

1 at least equal to or higher than the equilibrium price.

2 higher than the equilibrium price

3 at least equal to or lower than the equilibrium price

4 lower than the equilibrium price

4.5.2 Suppose the government wants to raise money by means of a tax levied on each unit of a good bought and sold. The government wants the incidence of the tax to fall mainly on buyers, not producers. It also wants to disturb the quantity bought and sold as little as possible. Which of the following demand or supply curves best meets these requirements?

1 Highly inelastic supply

2 Highly elastic demand

3 Highly elastic supply

4 Highly inelastic demand

4.5.3 If the government were to impose a tax of $1 per box on each box of cigars sold, assuming normally shaped demand and supply curves, this would result in

1 no change in equilibrium price because producers, not consumers, would pay the tax.

2 a rise of $1 in equilibrium price because producers would pass on the tax to consumers.

3 a rise of less that $1 in equilibrium price, depending on the slopes of the demand and supply curves of cigars.

4 a rise of more than $1 in equilibrium price, given the demand curve for cigars in inelastic.

4.5.4 If the government were to increase the purchase tax on new automobiles, what would be the effect on the equilibrium price and equilibrium quantity of second hand automobiles?

1 Both increase equilibrium price and equilibrium quantity.

2 Equilibrium price would fall but equilibrium quantity would increase.

3 Equilibrium price would rise but equilibrium quantity might increase, remain the same, or decrease.

4 None, since the second hand market is independent of the new market and the purchase tax applies only to new automobiles.

4.5.5 Suppose the market for hamburgers were initially in equilibrium. If the government were to impose a tax on each hamburger bought and sold, and if both the demand and supply curves for hamburgers were elastic, which of the following would be correct?

1 Producer surplus would increase but consumer surplus would decrease.

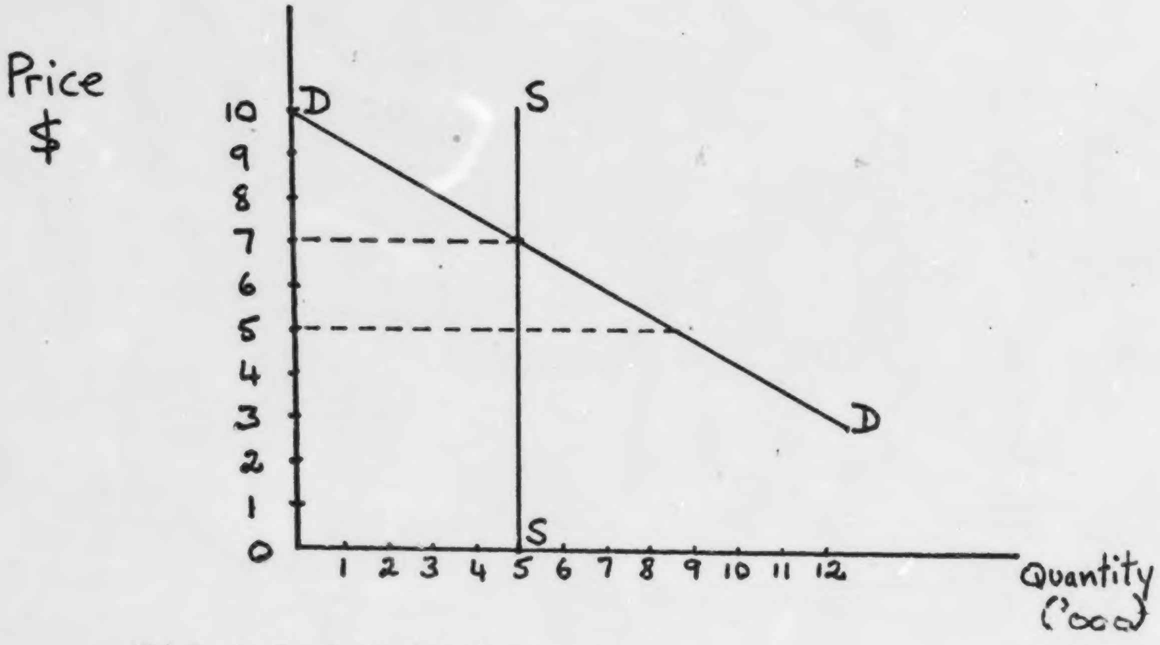
2 Producer surplus would decrease but consumer surplus would increase.

3 Both producer surplus and consumer surplus would increase.

4 Both producer surplus and consumer surplus would decrease.

4.5.6 Suppose a tennis match in aid of charity were arranged between Raquel Welch and Clint Eastwood. The sports stadium which would stage the match seats 5,000 people, and the organisers decide to charge a flat rate price of $5 per ticket. However, within hours of going on sale tickets are sold out and a black market develops.

Assume that the market for tickets is represented by the diagram below.



Which of the following is correct?

The black market price of tickets

1 could only be between $7 and $10.

2 could only be between $5 and $10.

3 would be $7 since that is the price individuals would be willing to pay for 5,000 tickets.

4 would be $10 since that is the maximum price individuals would be willing to pay to obtain a ticket.

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4.6.1 Assume the market for fresh salmon were in equilibrium. If the demand for fresh salmon were suddently to increase, which of the following would happen in the market period?

1 No change in either equilibrium price or equilibrium quantity.

2 A rise in equilibrium price and an increase in equilibrium quantity.

3 A rise in equilibrium price and no change in equilibrium quantity.

4 No change in equilibrium price and a decrease in equilibrium quantity.

4.6.2 Suppose the market for mackerel were initially in equilibrium. Following a rise in demand for mackerel, which of the following statements about the market for mackerel in the long run would be true assuming that costs are unaffected by firms entering the market?

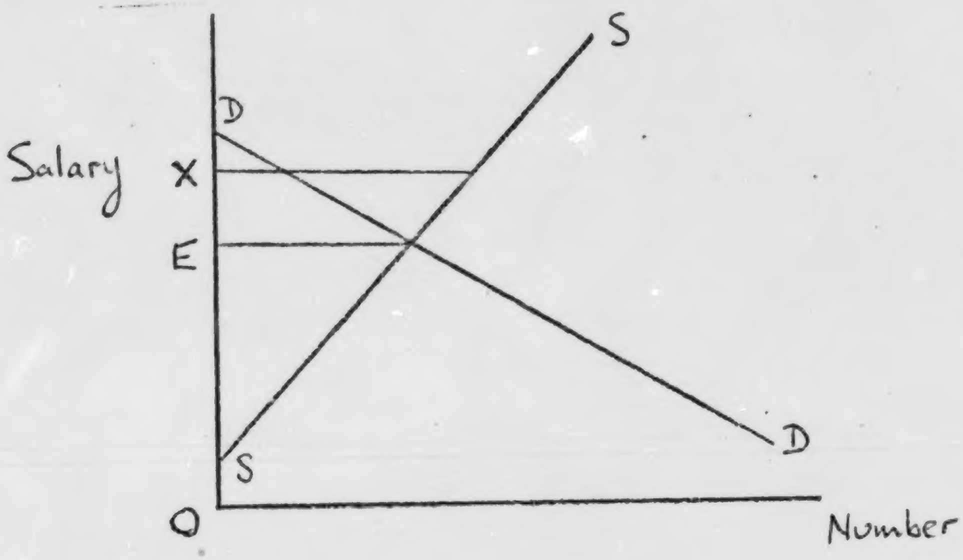
1 The equilibrium price and the equilibrium quantity of mackerel would both increase.

2 The equilibrium price of mackerel would rise, but the equilibrium quantity would remain the same.

3 The equilibrium price of mackerel would remain the same, but the equilibrium quantity would increase.

4 The equilibrium price and equilibrium quantity of mackerel would both remain the same.

4.6.3 Suppose the diagram below represents the market for biochemists.



If the supply curve relates current salaries to the number of biochemists seeking employment in three years time, and if the current salary level of biochemists is OX, which of the following is correct?

Over a period of time, the salary level of biochemists will

1 converge towards OE.

2 diverge from OE.

3 fluctuate around OE by equal amounts.

4 remain at OX.

4 Sample TIPS and Case Materials

4.1 Teaching Information Processing System (TIPS) Description

TIPS is a computer based testing and evaluation system which provides the capability of increasing the level of individualized instruction in economic classes. It is often presumed that the computer, as a teaching tool, imposes a barrier between the instructor and students; this system however is designed to increase the flow of information both from the instructor to the student concerning course objectives and content, and from the student to the instructor concerning progress during the course. The system achieves this by enabling the instructor to prepare, administer and process a series of multiple choice 'surveys' on a regular basis throughout the term. The results of these surveys are screened according to a set of decision rules provided by the instructor and a series of reports are printed out for each individual student on the basis of his/her score advising him/her about help sessions and suggested readings. Reports on individual and class progress are printed out for the instructor.

The emphasis of the TIPS method is on teaching, and the regular TIPS surveys are not normally used for assessment purposes; instead they are used to diagnoze student difficulties and to prescribe remedies before major examinations take place. In this way the instructor is made aware of the general progress of the class in relation to the teaching given. Individuals who are in need of help can be identified and resources devoted to remedial instruction at an early stage and continuously throughout the course. Thus TIPS can complement an existing course without any change in the content; however, before this can be done it is necessary for someone to plan the course in considerable detail. This has been accomplished through the preparation of the detailed course units, specification of objectives and production of objectives test banks for each unit.

4.1.1 Teaching Objectives and TIPS Survey for Micro Unit 1 (Economic Concepts, Issues and Tools)

The student should be able

...given examples of various situations (which may or may not involve money), to identify the nature of the "economic problem" in these situations, and to ascertain the underlying reasons why such an economic problem exists;

...using the principles of utility or welfare maximization, to demonstrate in realistic problem-like situations why an exchange may lead to greater economic efficiency and welfare;

...given realistic examples, to identify the relevant economic (opportunity) costs involved in these examples;

...given realistic examples involving resource allocation problems, to apply (technically and generally) the tools of marginal analysis to demonstrate the correct (most efficient) allocative decision;

...to describe the nature of the various components of the economic problem faced by all societies (what, how and for whom), to list the various characteristics which form the several broad techniques societies use to resolve the economic problem (command, traditional, market), and to classify real and hypothetical economies by the degree to which they conform to the broad models of market organization.

Specific Objectives for Micro Unit 1

The student should be able to

1.1 Scarcity and Choice

...relate the amount of goods consumed to the level of satisfaction or utility, both the total and at the margin;

...define resources;

...indicate how resources are integral to the society's or individual's level of satisfaction;

...identify what economists call the "fundamental fact of scarcity";

...define economics;

...given realistic examples, identify the nature of the "economic problem" in these situations;

...and indicate the underlaying reasons why such an economic problem exists;

...define a free good;

...identify examples of free goods;

...given examples involving free goods, indicate why the "economic problem" exists in these situations.

1.2 Preferences, Resources and Economic Efficiency

...in terms of utility, identify the goal individuals and nations will set given limited resources;

...indicate why preferences must be specific (or known) to attain the goal of welfare maximization; and

...given realistic situations, identify the case where welfare maximization has been attained;

...given an example of exchange, identify the reason why the level of total utility can increase without increasing the amount of goods produced;

...indicate why a point will be reached where utility can be increased only if additional goods or resources become available;

...indicate how international trade allows nations to increase their level of utility;

...identify the underlying conditions which determine the amount of goods and services a nation can produce;

...indicate why it is in the interest of a nation to use as few resources as possible in the production of any one good;

...define technical or engineering efficiency;

...define economic efficiency.

1.3 Marginal Analysis and Opportunity Cost

...define optimization;

...identify two alternative methods of finding the optimal allocation of limited resources;

...define marginal benefits;

...define marginal costs;

...given a case example, indicate how total utility will be affected if marginal benefits exceed marginal costs;

...define constrained maximization;

...identify why economics is concerned with optimization and constrained maximization;

...define opportunity costs;

...identify, given examples, a) marginal benefits, b) marginal costs, and c) opportunity costs;

...given realistic situations, identify, in terms of marginal analysis, when an activity is worthwhile expanding or contracting;

...indicate why, given an example involving benefit-cost analysis, a project should not be undertaken at a given level even though the total benefits exceed the total costs.

1.4 Different Economic Systems

...identify the basic decisions each nation faces given its resource constraints;

...select, from a list, the characteristics of the traditional solution to the economic problem;

...select, from a list, the characteristics of the command solution to the economic problem;

...select, from a list, the characteristics of the market solution to the economic problem;

...indicate how societies are normally classified within this traditional, command, or market solution framework;

...indicate why the classification of economies does not remain fixed;

...given an example containing the characteristics of an economy, identify whether the economy is traditional, command or market.

TIPS MICRO SURVEY 1

Topics:

1	Preferences and Resources
2	Scarcity and Choice
3	Preferences and Resources
4	Scarcity and Choice
5	Scarcity and Choice
6	Scarcity and Choice/Opportunity Cost
7	Economic Systems
8	Market Economy
9	Marginal Analysis
10	Marginal Analysis

Answers:

1	(4)
2	(1)
3	(1)
4	(4)
5	(3)
6	(2)
7	(4)
8	(3)
9	(3)
10	(2)

Reference Key:

1	Economic Concepts, Issues and Tools	I-B-2
2	"	II-A-2
3	"	II-B-2
4	"	III-A-3
5	"	III-C
6	"	III-C-2
7	"	IV-A-1
8	"	V-C-1
9	"	VIII-A-2
10	"	VIII-B-2

Answer Sheet for TIPS MICRO SURVEY 1 :

1-2

Last name: First name:

Student number: ☐☐☐☐☐☐☐

8-14

16-25

Please fill in the circle which you think corresponds to the correct answer. Erase completely any answer you wish to change.

	1	2	3	4
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○

When you have completed the survey please detach this sheet and hand it in as instructed. You may keep the copies of the questions for your records, and you will find them useful when the results of your performance on this survey are returned to you.

1 The Regional Council has to decide between spending the last £5 million of the year's budget on a new school or a bridge. The decision is made in favour of the bridge and immediately comes under attack from the educational press, the teachers' union and the local parent-teachers' association. From this it can be deduced that the decision was

1 wrong, because it is obvious that a new school has more important long term benefits than a bridge.

2 right, because there would be money to build the school next year.

3 wrong, because other items under the control of the Regional Council such as hospitals traditionally yield higher benefits than bridges.

4 possibly right or wrong, because it is impossible to add up the satisfactions of different people.

2 When society makes a decision to produce a capital good instead of a consumer good which of the following is true?

1 The consumption which could have taken place is postponed.

2 Fewer resources are used.

3 The output of the private sector will increase.

4 More human than non-human resources will be utilised.

3 Coal is a naturally occuring good. It has been estimated that there is sufficient coal under ground in the U.K. to provide all the energy we need for the next hundred years. Why then is coal not freely available to everyone who needs it?

1 Resources are utilised in extracting the coal and transporting it to consumers.

2 Other forms of fuel exist which compete with coal.

3 Coal does not give off as much energy as oil and gas.

4 Coal is extracted from the ground by obsolete technology.

4 In 1965 President Johnson stated that the US could have more "guns and butter"; that is, it could fight the war in Vietnam and carry out his Great Society domestic programmes. His statement demonstrates his belief that:

1 all the constraints under which the economy was operating (technical, social and economic) were binding at the time.

2 the USA was becoming more of a mixed economy.

3 the "invisible hand" would take care of his problem.

4 the USA was not producing to its full potential in 1965.

5 "A decision by a Regional Council to double spending on public transport is simultaneously a decision about the quality of educational services it will provide." This statement

1 was obviously not made by a teacher.

2 suggests that public transport and education are much the same thing.

3 is an application of the concept of scarctiy.

4 only holds true to the extent that children use public transport to go to and from school.

6 The real cost of a new hospital is

1 the yearly cost per patient per bed.

2 the best alternative foregone.

3 the money cost of the building.

4 the wages of the labour used in construction.

7 Which of the following is a true statement concerning the "economic problem"?

1 It does not exist in a command economy because decisions are made collectively.

2 It does not exist in a traditional economy because everyone has the same desires as his parents.

3 It exists in a market economy because it is only here that real choices are made.

4 It exists in all types of economies because every nation faces the problem of satisfying human wants.

8 With which of the following is a market economy concerned?

A What goods to produce and how to produce them.

B The allocation of goods and services among all households in the economy.

1 A only
2 B only
3 Both A and B
4 Neither A nor B

9 The marginal cost of the n^{th} unit of output is defined as

1 total cost divided by n.

2 total cost of n units divided by n-1.

3 the total cost of n units minus the total cost of n-1 units of output.

4 the total cost of n units minus the costs which could not be avoided.

10 A building firm has the option of making its own concrete bricks, of which it uses 400 per week or buying them from another firm for £4 each. The cost department provides the following figures on the cost to the firm of making bricks.

Number of bricks	Total cost	Cost per brick
100	£ 100	£1.00
200	200	1.00
300	660	2.20
400	1,200	3.00

Which of the following should the firm do?

1 It should produce all the bricks on its own, because the cost per brick is less than the price of buying them elsewhere.

2 It should produce 200 bricks and buy 200 from the other firm.

3 It should produce 300 bricks and buy 100 from the other firm.

4 It should enter the brick-producing market as a supplier, because it can produce bricks at a cost below the other procedures.

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4.1.2.

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                              TIPS
                    STUDENT PROGRESS REPORT
                 MICROECONOMICS (ECONOMICS 1)
                   PROFESSOR KEITH LUMSDEN

GUNN MICHAEL
ID # 7623593
SECTION #  9,  TUESDAY 11 AM
SECTION LEADER:  D MAIR

                     SURVEY #  2  (08/31/77)
                        BASIC CONCEPTS

 YOU CORRECTLY ANSWERED 9 OUT OF THE 10 QUESTIONS ON THIS SURVEY.
THE FOLLOWING TABLE SUMMARIZES YOUR ANSWERS AS WELL AS THE CORRECT
ANSWERS FOR THIS SURVEY.  YOU ARE URGED TO MAKE SURE THAT YOU
UNDERSTAND THE NATURE OF ANY INCORRECT RESPONSES WHICH YOU MADE.

              T A B L E    O F    R E S P O N S E S

QUES.  YOUR   CORR.        QUES.  YOUR   CORR.         QUES.  YOUR   CORR.
NUMB.  ANSW.  ANSW.        NUMB.  ANSW.  ANSW.         NUMB.  ANSW.  ANSW.

  1.     4      4            5.     3      3             9.     3      3
  2.     1      1            6.     2      2            10.     2      2
  3.     2      1            7.     4      4
  4.     4      4            8.     3      3

YOU HAVE MADE A GOOD START TO THE COURSE. THE TOPICS WITH WHICH YOU
MIGHT BE HAVING DIFFICULTY ARE IDENTIFIED BELOW. DETAILED READINGS
FOR EACH ARE SPECIFIED. IF AFTER REVIEWING THE SURVEY RESULTS AND
CONSULTING THE TEXTS YOU REMAIN UNSURE ABOUT ANY TOPIC OR ARE UNCLEAR
ABOUT THE CORRECT ANSWER TO ANY OF THE QUESTIONS YOU SHOULD CONTACT
D MAIR DURING OFFICE HOURS.

 THE TEXTS REFERRED TO BELOW ARE:
       P A SAMUELSON  ECONOMICS  10TH EDITION
       ATTIYEH LUMSDEN BACH  MICROECONOMICS  3RD EDITION

QUESTION 3: PREFERENCES AND RESOURCES
       SAMUELSON  CH 2 P 23
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                              TIPS
                    STUDENT PROGRESS REPORT
                 MICROECONOMICS (ECONOMICS 1)
                   PROFESSOR KEITH LUMSDEN

LEWIS GEORGE MCLEOD
ID # 7608195
SECTION # 10,  TUESDAY 11 AM
SECTION LEADER:  P CLARKE

                     SURVEY # 2  (08/31/77)
                         BASIC CONCEPTS


 YOU CORRECTLY ANSWERED 5 OUT OF THE 10 QUESTIONS ON THIS SURVEY.
THE FOLLOWING TABLE SUMMARIZES YOUR ANSWERS AS WELL AS THE CORRECT
ANSWERS FOR THIS SURVEY.  YOU ARE URGED TO MAKE SURE THAT YOU
UNDERSTAND THE NATURE OF ANY INCORRECT RESPONSES WHICH YOU MADE.

                 T A B L E   O F   R E S P O N S E S

QUES.  YOUR   CORR.        QUES.  YOUR   CORR.        QUES.  YOUR   CORR.
NUMB.  ANSW.  ANSW.        NUMB.  ANSW.  ANSW.        NUMB.  ANSW.  ANSW.

  1.     4      4            5.     4      3            9.     3      3
  2.     1      1            6.     1      2           10.     4      2
  3.     2      1            7.     4      4
  4.     4      4            8.     2      3

THE RESULTS OF THE FIRST TIPS SURVEY SUGGEST THAT YOU MAY BE HAVING
PROBLEMS WITH THE BEGINNING MATERIALS. IT IS TRUE THAT THE FIRST FEW
WEEKS OF A COURSE ARE OFTEN THE TOUGHEST, AND IT MAY BE THAT YOU ARE NOT
COMPLETELY FAMILIAR WITH ECONOMICS. REMEMBER THAT THE OBJECTIVE OF THE
TIPS PROGRAMME IS TO IDENTIFY YOUR PROBLEMS AND DO SOMETHING ABOUT
THEM. IF YOU WISH TO RETEST YOURSELF P CLARKE CAN PROVIDE YOU WITH A
MATCHING SET OF QUESTIONS.

 THE TEXTS REFERRED TO BELOW ARE:
       P A SAMUELSON  ECONOMICS  10TH EDITION
       ATTIYEH LUMSDEN BACH  MICROECONOMICS  3RD EDITION

QUESTION 3: PREFERENCES AND RESOURCES
       SAMUELSON  CH 2 P 23

QUESTION 5: SCARCITY AND CHOICE
       SAMUELSON  CH 2 P 23
       A L B  CH 1  PP 14-15

QUESTION 6: SCARCITY CHOICE OPPORTUNITY COST
       SAMUELSON  CH 1 P 5
       A L B CH 1 P 15

QUESTION 8: MARKET ECONOMY
       SAMUELSON  CH 2  P 18
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                              TIPS
                     STUDENT PROGRESS REPORT
                MICROECONOMICS (ECONOMICS 1)
                    PROFESSOR KEITH LUMSDEN

THOMSON IAN G.
ID # 7607849
SECTION # 11,  TUESDAY 1 PM
SECTION LEADER:  PROFESSOR THOMPSON

                    SURVEY #  2  (08/31/77)
                        BASIC CONCEPTS

OUR RECORDS INDICATE THAT YOU DID NOT TAKE THE SURVEY ON 08/31/77.
AS A RESULT, AT THIS TIME WE DO NOT HAVE ANY DIRECT INDICATION OF
YOUR UNDERSTANDING OF THE MATERIAL COVERED BY THIS SURVEY.  IN THESE
SITUATIONS, WE ASSIGN CERTAIN READINGS OR PROBLEMS WHICH ASSURE US
THAT YOU ARE FAMILIAR WITH THE MINIMUM TOOLS NEEDED TO MASTER THIS
ASPECT OF THE COURSE.  THIS ASSIGNMENT IS NOT A PENALTY.  RATHER,
IT IS A MEANS OF ENSURING THAT WE HAVE PROVIDED YOU WITH THE TOOLS
NEEDED TO MASTER MORE ADVANCED CONCEPTS.
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4.1.3

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08/31/77                                                           PAGE

                              TIPS
                  PROFESSOR"S SUMMARY REPORT

                MICROECONOMICS (ECONOMICS 1)
                  PROFESSOR KEITH LUMSDEN

                                                           CLASS

  NUMBER OF STUDENTS                                        101

  NUMBER TAKING TEST #  2                                    91
    --  BASIC CONCEPTS

  NUMBER RECEIVING STUDENT REPORT #  2                      101
    --  BASIC CONCEPTS



                  TABLE OF AVERAGE SCORES
                                                     AVERAGE PCT. CORRECT

                                                      CLASS
                                                     (N=  91)

 G152 -- SURVEY 1: BASIC CONCEPTS
         ALL  10 QUESTIONS ON THE TEST                   73.4
 G153 -- PREFERENCES AND RESOURCES
          QSTS 1                                         90.1
 G154 -- SCARCITY AND CHOICE
          QSTS 2                                         82.4
 G155 -- PREFERENCES AND RESOURCES
          QSTS 3                                         59.3
 G156 -- SCARCITY AND CHOICE
          QSTS 4                                         87.9
 G157 -- SCARCITY AND CHOICE
          QSTS 5                                         56.0
 G158 -- SCARCITY CHOICE OPPORTUNITY COST
          QSTS 6                                         67.0
 G159 -- THE ECONOMIC PROBLEM
          QSTS 7                                         98.9
 G160 -- MARKET ECONOMY
          QSTS 8                                         41.8
 G161 -- MARGINAL COST
          QSTS 9                                         81.3
 G162 -- MARGINAL ANALYSIS
          QSTS 10                                        69.2
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                            TIPS
                 PROFESSOR"S SUMMARY REPORT

                MICROECONOMICS (ECONOMICS 1)
                  PROFESSOR KEITH LUMSDEN


           ITEM ANALYSIS TABLE

           PERCENT    PERCENT IN CLASS  SELECTING
NO.  ANS.  CORRECT        ALTERNATIVE RESPONSES
                                                    NO
            CLASS       1     2     3     4     5  RESP.
           (N=  91)
 1    4       90        4     1     4    90     0     0
 2    1       82       82     2    10     5     0     0
 3    1       59       59    40     1     0     0     0
 4    4       88        7     3     2    88     0     0
 5    3       56        4     7    56    33     0     0
 6    2       67       13    67    20     0     0     0
 7    4       99        1     0     0    99     0     0
 8    3       42       52     4    42     2     0     0
 9    3       81        3    10    81     3     0     2
10    2       69       14    69     9     7     0     1
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4.1.4.

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                                                                PAGE   1

                         TIPS SUMMARY REPORT
                   MICROECONOMICS (ECONOMICS 1)
                     PROFESSOR KEITH LUMSDEN

SAMPLE:  A101 -- TUTOR
         #  9 -- D MAIR

                                                        SAMPLE    CLASS

NUMBER OF STUDENTS                                          9       101

NUMBER TAKING TEST #  2                                     9        91
  --  BASIC CONCEPTS

NUMBER RECEIVING STUDENT REPORT #  2                        9       101
  --  BASIC CONCEPTS



       INDIVIDUAL PERFORMANCE TABLE

  FILE COLUMNS INCLUDED IN THIS TABLE:

       G152 -- SURVEY 1: BASIC CONCEPTS
       G153 -- PREFERENCES AND RESOURCES
       G154 -- SCARCITY AND CHOICE
       G155 -- PREFERENCES AND RESOURCES
       G156 -- SCARCITY AND CHOICE
       G157 -- SCARCITY AND CHOICE
       G158 -- SCARCITY CHOICE OPPORTUNITY COST
       G159 -- THE ECONOMIC PROBLEM
       G160 -- MARKET ECONOMY
       G161 -- MARGINAL COST
       G162 -- MARGINAL ANALYSIS

                              PERCENT
                              CORRECT         PERCENT CORRECT ON
  STUDENT NAME                (TOTAL)         INDIVIDUAL GROUPING
                               G152    G153 G154 G155 G156 G157 G158 G159
                                         G160 G161 G162

1  ALEXANDER WALTER             60      100  100    0  100    0  100  100
                                          100  100  100
2  ANDERSON RUSSELL             70      100  100    0  100    0  100  100
                                            0  100  100
3  CRAWFORD RODERICK B.         80      100  100    0  100  100  100  100
                                            0  100  100
4  DREVER NORMAN                60      100  100    0  100    0  100  100
                                            0  100    0
5  DUTHIE IAN                   90      100  100  100  100  100  100  100
                                          100    0  100
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          INDIVIDUAL PERFORMANCE TABLE  (CONT"D)

                                   PERCENT
                                   CORRECT          PERCENT CORRECT ON
  STUDENT NAME                     (TOTAL)          INDIVIDUAL GROUPING
                                    G152     G153 G154 G155 G156 G157 G158 G159
                                                G160 G161 G162

6  GUNN MICHAEL                       90      100  100    0  100  100  100  100
                                                100  100  100
7  MCDONALD BRUCE                     70      100  100  100  100    0  100  100
                                                  0  100    0
8  MCVICAR JOHN                      100      100  100  100  100  100  100  100
                                                100  100  100
9  SYKES JOHN                         80      100  100  100  100  100    0  100
                                                  0  100  100

TOTAL # OF QUESTIONS,
       TEST AND GROUPINGS             10        1    1    1    1    1    1    1
                                                  1    1    1

-1  =  NO TEST DATA AVAILABLE



                TABLE OF AVERAGE SCORES
                                                        AVERAGE PCT. CORRECT

                                                         SAMPLE       CLASS
                                                        (N=   9)    (N=  91)

G152 -- SURVEY 1: BASIC CONCEPTS
        ALL  10 QUESTIONS ON THE TEST                     80.0         73.4
G153 -- PREFERENCES AND RESOURCES
         QSTS 1                                          100.0         90.1
G154 -- SCARCITY AND CHOICE
         QSTS 2                                          100.0         82.4
G155 -- PREFERENCES AND RESOURCES
         QSTS 3                                           44.4         59.3
G156 -- SCARCITY AND CHOICE
         QSTS 4                                          100.0         87.9
G157 -- SCARCITY AND CHOICE
         QSTS 5                                           55.6         56.0
G158 -- SCARCITY CHOICE OPPORTUNITY COST
         QSTS 6                                           88.9         67.0
G159 -- THE ECONOMIC PROBLEM
         QSTS 7                                          100.0         98.9
G160 -- MARKET ECONOMY
         QSTS 8                                           44.4         41.8
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08/31/77                                                          PAGE   3

                              TIPS SUMMARY REPORT
                        MICROECONOMICS (ECONOMICS 1)
                          PROFESSOR KEITH LUMSDEN

SAMPLE:  A101 -- TUTOR
         #  9 -- D MAIR



                  TABLE OF AVERAGE SCORES  (CONT'D)
                                                    AVERAGE PCT. CORRECT

                                                     SAMPLE       CLASS
                                                    (N=   9)    (N=  91)

G161 -- MARGINAL COST
        QSTS 9                                          88.9        81.3
G162 -- MARGINAL ANALYSIS
        QSTS 10                                         77.8        69.2



                       ITEM ANALYSIS TABLE

                    PERCENT            PERCENT IN SAMPLE SELECTING
   NO.  ANS.        CORRECT              ALTERNATIVE RESPONSES
                                                                       NO
                 SAMPLE    CLASS        1      2      3      4      5  RESP.
                (N=   9) (N=  91)
    1    4         100        90        0      0      0    100      0     0
    2    1         100        82      100      0      0      0      0     0
    3    1          44        59       44     56      0      0      0     0
    4    4         100        88        0      0      0    100      0     0
    5    3          56        56       11      0     56     33      0     0
    6    2          89        67        0     89     11      0      0     0
    7    4         100        99        0      0      0    100      0     0
    8    3          44        42       44     11     44      0      0     0
    9    3          89        81        0      0     89     11      0     0
   10    2          78        69       22     78      0      0      0     0
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4.2 Case Description

A common criticism of economics instruction is that the subject matter taught is largely unrelated to what is happening in the real world. Such perceptions are reinforced by final examinations which typically measure the student's grasp of the economist's tool kit, rather than the student's facility to apply concepts and tools to analyze simple and complex real world problems. Even in those courses which make an attempt to teach students to apply economic tools, the measurement of this skill is often postponed until the final examination, i.e. the opportunity for the student to learn how to apply fundamental economic concepts is limited.

One way to overcome this inadequacy is by utilizing cases throughout the course, and by providing periodic feedback to the student on his or her achievement on the cases. A case, be it hypothetical or real, presents the student with a description, often including data, of an economic problem facing an individual, a firm or a nation. The student is required to use the tools or concepts at his disposal to resolve the problem, and to reach a solution or proposal based on an analytical approach. This is not to imply that every real world economics problem has a unique or optimal solution but rather that careful analysis can separate issues into various components (e.g. efficiency versus equity), and that the consequences of different actions can be analyzed.

In many economics courses, cases are not new. Those teachers who pose real world problems in class and attempt to demonstrate how professional economists tackle such problems are implicitly utilizing a "case approach". However, it is only within the last five years that written cases and suggestions for analysis have appeared in any systematic way in written texts. No large-scale evaluation of the effectiveness of the approach, despite its intuitive appeal, has been undertaken.

MICRO UNIT 1

Case 1.1 Marginal Analysis and Noise Pollution

There are certain sounds or noises which give certain people pleasure - the discotheque in full swing or the grand opera chorus. There are other noises, equally loud, which yield displeasure - motorcyles with no silencers, or jet aircraft. Many motorways which pass through residential areas cause noise levels which result in residents' complaints. Often action is taken to reduce such noise levels to tolerable proportions.

How can marginal analysis help a society make sensible decisions in reducing noise pollution? Noise can be measured on a dB(A) (decibel) scale. For noise levels below 68 on the scale people seldom complain, whereas permanent ear damage can result at dB(A) levels above 90 if an individual is exposed to such a level over a protracted period of time. (You might think about this if you are a rock music fan and you might also note the earmuffs worn by ground personnel at airports.)

Let us imagine that the residents of some community decide to reduce the noise level from the motorway passing through their community. The average noise level measures 85 on a dB(A) scale. The options shown in Table 1.1(1) are available to the community to reduce motorway noise. The community can choose one or more.

Table 1.1(1) Options Available to the Community

Action	Marginal change in noise level	Annual Cost (£)
1 (a) Build concrete wall 2 metres high	-10dB(A)'s	160,000*
OR (b) Build concrete wall 3 metres high	-12dB(A)'s	190,000*
OR (c) Build concrete wall 4 metres high	-13dB(A)'s	230,000*
2 Reduce speed limit and enforce limit through police control (-10 mph)	- 3dB(A)'s	90,000
3 Resurface road	- 2dB(A)'s	70,000*
4 Rebuild and sink road 4 metres	-10dB(A)'s	2,500,000*

* Total cost divided by estimated number of years of useful life.

The residents decide that they are prepared to pay, collectively, £31,000 annually for each dB(A) that noise is reduced until a level of 68 is reached and nothing thereafter for further noise reduction.

The local council members propose that a 4 metre wall be built but no other option be considered. Their reasoning is that the annual costs of the 4 metre wall would be £230,000 and the annual benefits £403,000. Thus, they argue, the 4 metre wall is clearly worthwhile. They propose only the 4 metre wall and point out that no other option yields such a large surplus benefit over cost.

As an economic consultant to the 'Residents Against Motorway Noise Committee' your report begins as follows. "The Council has failed to reach the best solution for reducing noise pollution...."

Complete the report.

Analysis

Case 1.1 Marginal Analysis and Noise Pollution

Consider each of the possibilities in terms of the cost and benefit:

1 a Wall 2 metres high

It is clear that the cost of building the lowest wall is less than the benefit, i.e., £160,000 compared to £310,000.

OR b Wall 3 metres high

The cost of an additional metre is £30,000, i.e., £190,000 - £160,000, and the corresponding benefit is £62,000, i.e., £372,000 - £310,000. Thus the marginal benefit of the additional metre exceeds the marginal cost and consequently the 3 metre wall is worth building.

OR c Wall 4 metres high

The 4 metre wall, however, fails on the marginal criterion since the benefit of the last metre is £31,000, i.e., £403,000 - £372,000, is less than the corresponding cost of £40,000, i.e., £230,000 - £190,000. Thus the 4 metre wall should not be built even although the total benefit of a 4 metre wall exceeds the total cost.

2 Speed limit

The benefit of the lower average speeds valued at £93,000, i.e., 3 x £31,000, is greater than the cost of police control of £90,000. Hence it is worthwhile to adopt this course of action.

3 Resurface road

In this case the annual cost of £70,000 is greater than the annual benefit of 2 x £31,000 = £62,000, and consequently the road should not be resurfaced.

4 Rebuild and sink road

The annual benefit of this course of action is £310,000, i.e., £31,000 x 10, and the cost is £2,500,000. Consequently the road should not be rebuilt.

The only two options which are economically justifiable, therefore, are to build a wall 3 metres high and impose and enforce a speed limit. The total noise reduction from the combination of these two courses of action would be 15 dB(A)'s which would reduce the actual noise level to 70 dB(A)'s, i.e., 85 - 15 dB(A)'s. This is higher than the level of 68 dB(A)'s below which there is no benefit associated with noise reduction, but no option yields marginal benefits in excess of marginal cost. It is only through the application of the marginal approach that the most efficient solution to the problem becomes apparent. The council erred in considering the total rather than marginal benefits and costs.

MICRO UNIT 1

Tutor's Marking Guide

Case 1.1 Marginal Analysis and Noise Pollution

1 The range of marks will be 0 - 10.

2 0 marks should be assiged to students failing to hand in the assignment.

3 10 marks should be awarded to students submitting the suggested analysis.

4 Correct analysis of 'walls' (i.e., 1a, b, and c) should be awarded 4 marks.

5 Correct analysis of 'speed limit' should be awarded 2 marks.

6 Correct analysis of 'resurface road' should be awarded 1 mark.

7 Correct analysis of 'rebuild and sink road' should be awarded 1 mark.

8 Students pointing out that the efficient solution is the combination of the 3 metre wall and speed limit control, and that the noise level of 68 dB(A)'s cannot be reached efficiently because no economically feasible option for getting below 70 dB(A)'s exists, should be awarded 2 marks.

9 Within these guidelines tutors should use their own discretion. For example, a student analysing coreectly 'walls' and 'speed limit' as in the Case 1.1 Analysis and then stating that the remaining 2 options, 'resurface' and 'sink road' fail to meet the marginal criteria should not be penalised for omitting the numbers.

10 No case assignment should be returned to a student without tutor comments. Each case should be returned to the student with a copy of the Case 1.1 Analysis.

11 Tutors should set their own deadlines by tutorial group for handing in each case with the constraint that a one week lag only should occur between giving out the case in tutorial and returning it graded for possible discussion in tutorial.

MICRO UNIT 1

Case 1.2 The Cost of Re-training

The Government of a European country has, for some years, been running a manpower re-training programme designed to equip people with new skills and professional qualifications.

One highly successful part of the programme consists of an experimental course which runs for six months and leads to a diploma in basic accountancy. It operates through a combination of television programmes and work sheets. Recently the course was repeated, and each student had a choice of study time. The programmes were televised daily from 09.00 to 12.30 and were repeated from 19.00 to 22.30 for students who wanted to study in the evenings.

Although the programmes could be watched by a national audience, only officially enrolled students had the work sheets, which had to be completed while each programme was being broadcast. Only registered students were eligible for the diploma.

120 students took the course. They consisted of:

1 40 skilled workers who had voluntarily left a major car assembly plant, and whose departures caused car production to fall by ten cars per month.

2 40 people who had been unemployed for over a year but were actively looking for a job.

Each of the above groups elected to study during the 09.00 to 12.30 broadcasts.

3 40 people, all of whom were employed, but chose to study during the evening broadcast.

Questions:

A Ignoring costs associated with transmitting the programmes, producing and distributing the work sheets, marking scripts, and awarding diplomas, were the costs to the nation of each of the three groups taking the course identical?

B Were the costs of taking the course to each of the 120 individuals identical?

Explain your answers in not more than one page.

MICRO UNIT 2

Case 2.1 Cash vs. Vouchers

In a certain European country, there has been a significant rise in the total bill for welfare payments made to various groups of citizens. In the past few years, vigorous campaigning by pressure groups on behalf of the chronically sick, the elderly, the unemployed, the blind, widows, people injured at work and other sections of the population has highlighted their problems and brought about increases in the size and scope of welfare payments, i.e., sums of money paid by the government to people in the above categories.

Recently, however, a number of politicians made speeches in which they criticised the allegedly comfortable life style of many of the disadvantaged groups. In one newspaper article entitled "Luxury at the Taxpayers' Expense", one politician claimed that the general public was being "taken for a ride" as the "supposedly underprivileged members of society squander their welfare payments on drinking, smoking and gambling rather than on necessities such as food and clothing for which the payments were really intended".

In response to such criticisms, the government decided to conduct an experiment. A particular group of welfare payment recipients - identical in terms of background, household size and monthly expenditure - was divided into two test samples. Each household in the first sample continued to receive the normal welfare payment of £150 per month, while households in the second sample received a food voucher worth £100 and a clothing voucher worth £50 every month. These vouchers could be exchanged only for food and clothing respectively at certain stores nominated by the government, could not be sold for cash, and could not be transferred to other households. All the households in each sample also continued to receive an income of £100 per month from other sources. After a trial period of three months, the expenditure patterns of the two samples were contrasted, as shown in Table 2.1(1).

Table 2.1(1) Expenditure Patterns of Two Sample Groups

	Monthly Expenditure (£)	
	Sample 1 (Cash)	Sample 2 (Vouchers)
Food	80	100
Clothing	40	50
Other goods and services	130	100
Total:	250	250

The supporters of the voucher system have issued a statement to the press claiming that the experiment vindicates their proposals, since the households who received cash spent £30 less per month on food and clothing than the households receiving vouchers, and obviously squandered the rest of their welfare payment on 'non essentials'.

The government, however, is still not entirely convinced about the merits of the voucher system, and has asked its Chief Economic Adviser to analyse the results of the experiment and comment on the statement issued by the supporters of the voucher system.

The Chief Economic Adviser has started his report as follows:

"The supporters of the voucher system are completely wrong......."

Complete the report.

MICRO UNIT 2

Case 2.2 The Demand for Bus Travel

The transport authority in a UK city wishes to increase the total expenditure on fares from passengers travelling on its bus services. The specific proposal under consideration would involve increasing fares on every bus route by 3p. Some members of the transport authority claim that it would be easy for passengers to understand, effective and administratively convenient. But other members disagree about whether the proposed flat rate 3p. fare increase would achieve the desired result, and whether such an increase would represent the optimal pricing strategy for the authority.

Basically the debate revolves around the likely effect of fare increases on the demand for bus travel. Some members of the authority believe that the proposed fare increase would cause a large fall in the number of bus journeys undertaken, with a consequent reduction in expenditure on bus travel by passengers, while other members argue that the number of journeys would not change significantly, and so passenger expenditure would increase.

At present the authority's bus services can be divided into three groups of routes, according to the length of journey and fare charged. These are shown in Table 2.2(1).

Table 2.2(1) Bus Routes and Associated Fare Levels

Routes	Current Fare Level
Group A (short journey)	9p.
Group B (medium journey)	12p.
Group C (long journey)	15p.

In order to help them arrive at a decision, the authority organised an experiment involving a representative sample of 9 bus routes - 3 from each of the groups in Table 2.2(1). The fare on each of the 9 routes was increased by 3p., and a record was kept of the total expenditure on each route during the last month of the original fare and the first month of the increased fare. The results are shown in Table 2.2(2).

The authority had hoped to make a decision about the desirabilty of a flat rate 3p. increase in all fares on the basis of the experiment. The members of the authority, however, are still in disagreement, despite the fact that total expenditure on the 9 experimental routes increased from £8,972,000 to £9,210,000 after the 3p. increase.

Table 2.2(2) Expenditure by Passengers on Nine Selected Routes Before and After Fare Increase

Group A	Expenditure during last month of 9p. fare £'000	Expenditure during first month of 12p. fare £'000
Route 1	1,225	1,250
Route 2	1,250	1,500
Route 3	1,000	1,150

Group B	Expenditure during last month of 12p. fare £'000	Expenditure during first month of 15p. fare £'000
Route 4	700	650
Route 5	900	900
Route 6	872	880

Group C	Expenditure during last month of 15p. fare £'000	Expenditure during first month of 18p. fare £'000
Route 7	900	820
Route 8	1,000	960
Route 9	1,125	1,100

Imagine you have been employed by the authority as an economic consultant to provide independent analysis and guidance. In his letter to you, the chairman of the transport authority has asked you to focus your attention on two questions:

1. "Since total expenditure on fares on the experimental routes increased after the trial fare increase, would our optimal pricing strategy be to proceed with the flat rate 3p. increase on all routes?"

2. "What factors might explain the way in which passengers on different routes reacted to the fare increase?"

Draft your answers in the form of a report.

MICRO UNIT 3

Case 3.1 Production Decisions for the Jewellery Manufacturer

The Easycharm Manufacturing Company produces four products: agate bracelets, turquoise necklaces, opal rings, and amethyst brooches. Its objective is to produce and sell the quantity of each product which maximises profit. Current market prices of the products are given in Table 3.3(1).

Table 3.3(1) The Easycharm Manufacturing Company's Products and Prices

Product	Price (£)
Bracelets	4.00
Necklaces	300.00
Rings	15.00
Brooches	8.00

Retail outlets are prepared to take as many bracelets, necklaces, rings, and brooches, at these prices, as the Easycharm Manufacturing Company can produce. Total costs of production for different quantities of each product are given in Table 3.2(2).

Table 3.3(2) Total Costs for Different Levels of Output

Bracelets		Necklaces		Rings		Brooches	
Output per day	Total cost (£)	Output per day	Total cost (£)	Output per day	Total cost (£)	Output per day	Total cost (£)
0	100	0	800	0	300	0	0
100	200	1	900	10	400	10	100
200	350	2	1,025	20	540	20	210
300	550	3	1,200	30	700	30	330
400	850	4	1,500	40	900	40	490
500	1,300	5	1,900	50	1,500	50	700

Currently, the Company produces 300 bracelets, 5 necklaces, 10 rings, and 30 brooches per day. But Madame Pauline, the Managing Director, is worried about the financial position of the Company and doubts whether the goal of profit maximisation is being achieved.

You have been employed as a consultant by the Managing Director and given the following brief - "Given the continuation of current market prices and production schedules, please advise me which, if any, of our activities should be expanded, contracted or eliminated in the short run."

Draft your reply in a report.

Case 3.2 The Case of the Chocolate Bars

The following conversation between Fred, a café owner, and his accountant was recorded. Fred is explaining why he recently set up a stand on his counter to sell chocolate bars...

Fred: ".... so you see I plan to make plenty of profit from this deal. The chocolate bar company gave me the stand free of charge, and I pay 5p. for each chocolate bar. So since I can sell them at 15p. each, I make 10p. profit on each bar. Wish I could make a 200% rate of profit from the rest of my business..."

Accountant: "You don't seriously believe what you've just said, do you?"

Fred: "What do you mean?"

Accountant: "Your business is liable to go bankrupt if that's the way you analyse your costs. Look, you haven't yet allocated a single penny of overheads to this new chocolate bar question. There's the rent and rates, for example. A proportion of those costs should be allocated to the selling of chocolate bars. Then there's a share of the electricity bill to be allocated. Now you also employ a window cleaner once a week, don't you? So a share of his cost will have to be borne as well....."

Fred: "But wait a minute, surely...."

Accountant: "Please don't interrupt when I'm trying to note down a full list of the relevant costs to charge to this operation. Oh yes, and then there's your cook; we'll have to allocate some of his costs...."

Fred: (Impatiently) "What has the cook got to do with chocolate bars? He doesn't make them. He doesn't even like them! This is stupid!"

Accountant: (Wearily) "Look, there's no need for insults. I'm only trying to help, and save you from financial doom. Oh yes, and one more thing. The stand holding the chocolate bars is using valuable counter space. So we'll have to charge something for that as well."

Fred: "But the stand only uses a part of the counter that wasn't being used for anything else...."

Accountant: (Wisely) "Fred, you don't have any valueless space. If you're going to use part of the counter to sell chocolate bars, you must charge the operation the cost of using that space."

Fred: (Hopefully) "OK, OK, I'm convinced. So I forgot to include a few costs. But it still means I'll make a fat profit, doesn't it?"

Accountant: "I'm sorry to disappoint you, but by my reckoning, once you've added up all the allocated overheads it's probably costing you 50p. to sell each chocolate bar. So in fact you're incurring a loss of 35p. on each bar just now."

Fred: (Slightly dazed) "So what should I do?"

Accountant: "It's clear, isn't it? You must sell these bars at over 50p. each if you want to make a profit. It's as simple as that."

Fred: (Hopefully) "But that's crazy! Nobody will buy chocolate bars at that price. Look - I've got a better idea. Why don't I get out of this chocolate bar business for good, get rid of the stand and all the bars I bought. Would that make things better?"

Accountant: (Patronisingly) "Fred, you really don't understand costing, do you? That would make things even worse. Then you would lose the chocolate bars' contribution to existing overheads so all your other costs would go up to compensate. No, I'm afraid you're in the chocolate business whether you like it or not."

Fred: (Perplexed) "And the chocolate bar salesman said it was a good way to make money......... buy a regular supply of chocolate and watch the pounds roll in......"

Accountant: (Triumphantly) "Just thank modern methods of costing for saving you."

How much economic sense does the Accountant's proposals make? Should Fred continue in the chocolate bar business?

MICRO UNIT 4

Case 4.1 The World Market for Cereals

The following extract is taken from a report on world production of cereals in The Economist.

".....Each year the world produces about 1,250 - 1,350 million tonnes of cereals. A poor harvest may be 4% or 5% or 6% below a good one, but any drop will usually be masked by the natural upward trend - about 2½% since the start of the 1960's. This is rather faster than likely future population growth, but slower than the likely annual growth in demand for food.

..... In a single country, the swings can be much greater. Russia's 1975 crop was about 140 million tonnes; a year later it harvested about 220 million tonnes. And all the world's weather could, conceivably, go marvellously right or dreadfully wrong. A poor harvest (like 1974's) may be a little lower in volume but it is a lot higher in price...."

Questions:

A Assuming that the world demand for food increases annually, as suggested in the first paragraph of the extract, what effects will this have on the world market for cereals if,

- (i) there were to be a good harvest compared to the previous year?
- (ii) there were to be a poor harvest compared to the previous year?

B Explain the economics which produces the 1974 result stated in the last sentence. How would the 1974 result compare with a situation in which the world's weather went 'dreadfully wrong'?

Case 4.2 Housing in South California

The following extracts are taken from a report entitled 'South California Bubble', which appeared in The Economist.

> "South California is in the grips of a property boom quite out of step with the rest of the country. A frenzy of speculation has pushed up new house prices by 2% a month for the past two years - 50% faster than the national average.........
>
> The market seems to be expanding as people move south, as post-war babies begin rearing their own families, and as the burgeoning numbers of divorced couples search for two homes rather than one; indeed the number of single adults desiring to live alone is one of the most remarkable features of California's housing boom....
>
> ....to make things worse, the recent world wide inflation in materials prices has significantly pushed up building costs, and builders also fear they may soon run out of land on which it is permissible to build....
>
> The hottest area for building and for speculation is Orange County, a populous, largely residential area south of Los Angeles, where the demand for homes is so great that lotteries have become commonplace. There are, for example, 5,500 names on the waiting list for the next 100 houses to be built in one popular tract. Elsewhere, a construction company recently held a lottery to select those among 1,000 applicants who might buy 191 houses priced at $115,000."

Questions:

1 Illustrate how the market for new houses in South California is operating in such a way that the price of new houses is increasing so quickly and yet relatively few new houses are being built.

2 Explain what effect the operation of the market for new houses in South California should be having on the market for existing houses.

3 In terms of economic efficiency, evaluate the lottery scheme construction companies are adopting in Orange County to allocate new houses to prospective owners. Who benefits and who loses under such a scheme?

Case 4.3 Gasoline Taxes and Rebates

In 1977 President Carter proposed that the tax on gasoline should be increased in order to reduce its consumption thereby lessening US dependence on imports of oil. At the same time, he proposed that income tax be reduced in such a way that people with low incomes would be no worse off than before.

Following the proposals, a writer called Tom Wicker wrote an article in the New York Times in which he claimed that gasoline consumption in the US would not be reduced as a result of these policies. He argued that the decision to lower taxes was equivalent to giving a rebate to people in return for the higher tax they would pay on gasoline. Wicker then concluded that people would probably buy as much petrol after the tax increase as before.

The following extracts are taken from a letter to the New York Times, (May 10, 1977), written by Walter Salant, Senior Fellow Emeritus at the Brookings Institution, Washington.

> "In his column 'Rebates or Revenue?' Tom Wicker appears to assume that the rebate of an excise tax cancels the consumer's incentive to economise on (i.e., *consume less of*) the taxed commodity regardless of whether the amount of the rebate is or is not related to the amount of consumption of the taxed commodity.
>
> When an excise tax is imposed (or increased) on purchases of a commodity the rise in price of the taxed commodity to consumers has two effects. First, the purchasing power of the consumer's total money income is reduced by the fact that he can buy less of his total accustomed market basket of goods and services. Secondly, there is a rise in price of the taxed commodity relative to the prices of other things the consumer buys.
>
> If the amount of the income tax rebate to consumers is not related to the quantity of the commodity that they, individually, buy, the rebate may offset the amount of money people pay in increased tax but it does not offset the relative change in prices. Individual consumers would still have an incentive to economise on the taxed commodity.
>
> So far as I know, the Administration has not proposed tying the amount of the rebate to the amount of the individual's gasoline consumption. The only proposed link is between the aggregate tax revenue and the aggregate rebate. Such a rebate would not reduce the incentive of the consumer to economise on gasoline except to a minor degree."

Questions:

1. On what issues are Wicker and Salant disagreeing?
2. With whom do you agree? In reaching your conclusion, make explicit any assumptions you are making.

5.1

STUDENT INFORMATION QUESTIONNAIRE

We would like you to provide the following information for the purposes of enabling us to plan this course more closely to your needs. Although you may have provided the information already, it is more convenient for us to ask for it now rather than to search through student records. Thank you for your help.

Surname: Forename:

Sex: If male circle 1, if female circle 2 1
2

Date of Birth: Year 19 ☐☐ Month ☐☐

It is possible that the reasons for taking economics are related to students' attitudes toward the subject and hence have implications for the methods of teaching which best suit specific students. Answer the question below which refers to your student type: A or B or C.

A. You are studying another subject for which this is a required course. Circle the number which applies.
Yes.... 1
No..... 2

B. You are studying for an economics degree for which this is the first course. Circle the number corresponding to your reason.

You studied economics at school, and this stimulated your interest..... 1
You did not study economics at school, but you heard about it from your teacher or other students.................................... 2
The entry requirements were minimal.................................... 3
You heard that it is a relatively easy subject in which to obtain a degree... 4
It is a subject you wish to know about because of your political ideals.. 5
You felt it would be the subject with something useful to say about world issues and problems.. 6
It is a mystery to you why you are studying economics................. 7
Other - please be brief ______________________________ 8

C. You are studying for a degree in a subject in which you are required to take one or move elective outside subjects. Circle the number.

You heard that economics was an easy option.......................... 1
It seemed a good complement to your other studies..................... 2
It was the only real alternative open to you.......................... 3
It was the least unattractive of all the possibilities................ 4
You made a more or less random selection.............................. 5
You wished to know more about economics because of your political ideals.. 6
You felt that economics would equip you to analyse real world problems and issues... 7

5.2 Continuous Evaluation Questionnaire

Traditionally in institutions of higher education little attention has been paid either to student opinion of the course and instructors, or to what students think they have learned. Final examination marks tend to be the only measuring rod of course output. It is possible that the subjective opinions of students and instructors, especially where non-traditional teaching methods have been used, are not only valid measures of course output but may be the critical factor in determining the optimal type of course for students, instructors and institutions.

Because of the potential of such information your careful and considered answers to the questions below are extremely important.

Continuous Evaluation Questionnaire

Surname:

Forename:

What is your opinion of the overall value of this course, taking into account your enjoyment of the teaching methods and the amount which you feel you have learned so far? Circle the appropriate number on the scale.

LOW				HIGH
1	2	3	4	5

On the scale below, circle the number which you feel accurately reflects your enjoyment with the different methods of teaching to which you have been exposed during this course.

	LOW				HIGH
Lectures	1	2	3	4	5
Textbook	1	2	3	4	5
Programmed Text	1	2	3	4	5
Readings	1	2	3	4	5
TIPS	1	2	3	4	5
Cases	1	2	3	4	5
TIPS Tutorials	1	2	3	4	5
Case Tutorials	1	2	3	4	5

At the beginning of this course you were provided with a detailed course outline which set out the main topics to be covered in the course. Up to this time you have covered the following topics:

1. ECONOMIC CONCEPTS, ISSUES AND TOOLS
2. DEMAND
3. SUPPLY
4. PRICE AND OUTPUT DETERMINATION IN MARKETS

Allocate 100 points among the teaching methods listed below to reflect the contribution you consider they have made to your understanding of these topics.

Lectures	Textbook	Programmed Text	Readings	TIPS	Cases	TIPS Tutorials	Case Tutorials	None of These	TOTAL
									100

You have now been studying economics for 6 weeks. The following questions refer to the use which you have made of each teaching method.

Lectures:	How many of the twelve lectures have you attended?		___
Textbook:	How many of the eight recommended chapters have you read?		___
Programmed Text:	How many of the eight recommended chapters have you read?		___
Readings:	How many of the recommended readings have you read?		___
TIPS:	Have you followed up the remedial assignments?	Yes No	1 2
Cases:	Have you followed up the remedial assignments?	Yes No	1 2
TIPS Tutorials:	How many have you attended?		___
Case Tutorials:	How many have you attended?		___

5.3 End of Quarter Student Evaluation Questionnaire

Name:

How would you compare the amount of time spent on this course with the amount of time spent on other courses you took this quarter? Circle the appropriate number.

	LOW				HIGH
	1	2	3	4	5

If your answer to the above question was low (i.e. 1 or 2), please give the reason(s). Tick the appropriate box(es).

- High volume of written work in other courses ☐
- High volume of reading work in other courses ☐
- Economics is not my major subject ☐
- I find the course uninteresting ☐
- Other (specify)............................ ☐

If your answer to the above question was high (i.e. 4 or 5), please give the reason(s). Tick the appropriate box(es).

- High volume of written work in tutorials in the course (e.g. essays, cases, etc.) ☐
- High volume of reading work in the course ☐
- Economics is my major subject ☐
- I find the course interesting ☐
- Other (specify)............................ ☐

On the scale below, circle the number which reflects your enjoyment with the teaching methods used this quarter. Ignore any teaching method to which you have not been subjected regularly throughout the quarter.

	LOW				HIGH
Lectures	1	2	3	4	5
Textbook	1	2	3	4	5
Programmed Text	1	2	3	4	5
Readings	1	2	3	4	5
TIPS	1	2	3	4	5
Cases	1	2	3	4	5
TIPS Tutorials	1	2	3	4	5
Case Tutorials	1	2	3	4	5

Circle the number which reflects your opinion of economics in relation to the characteristics listed.

		LOW				HIGH
Economics is:	relevant to real life	1	2	3	4	5
	interesting	1	2	3	4	5
	intellectually demanding	1	2	3	4	5

Allocate 100 points among the teaching methods to reflect the contribution each has made to your understanding of this course.

Lectures	Textbook	Programmed Text	Readings	TIPS	Cases	TIPS Tutorials	Case Tutorials	None of These	TOTAL
									100

If the final examination this term were to reflect microeconomics comprehension accurately, in which of the following categories of marks would you appear? Circle the number which applies.

<20	21-30	31-40	41-50	51-60	61-70	71-80	>80
1	2	3	4	5	6	7	8

Knowing now what you do about this course, would you have taken this course if it were not required? Tick the appropriate box.

Yes ☐

No ☐

Each of the teaching methods used in this course has a number of characteristics which contribute to learning. Allocate 100 points among the characteristics for each method to reflect the extent to which each characteristic has contributed to your learning.

Method	Feedback	Gearing to individual needs	Applicability to real life	Other	TOTAL
Lectures					100
Textbook					100
Programmed Text					100
Readings					100
TIPS					100
Cases					100
TIPS Tutorials					100
Case Tutorials					100

Students vary in their learning needs, some of which are listed below. Allocate 100 points among the teaching methods to reflect the extent to which each met your learning needs.

TECHNIQUE	Identifying areas of weakness	Clarifying concepts	Connecting different concepts	Applying concepts to real life problems	Analysing complex situations	Evaluating economic policy decisions	TOTAL
Lectures							100
Textbook							100
Programmed Text							100
Readings							100
TIPS							100
Cases							100
TIPS Tutorials							100
Case Tutorials							100

On the scale below circle the number which reflects your overall rating of:

	LOW				HIGH
Your professor...........................	1	2	3	4	5
Your tutor...............................	1	2	3	4	5

Circle the number (or x) which reflects your opinion of the different characteristics of your lecturer and tutor during this course:

	Professor						Tutor					
	NO OPINION	LOW				HIGH	NO OPINION	LOW				HIGH
Imparts enthusiasm........	x	1	2	3	4	5	x	1	2	3	4	5
Knows subject matter well.	x	1	2	3	4	5	x	1	2	3	4	5
Is well prepared for class	x	1	2	3	4	5	x	1	2	3	4	5
Demonstrates practical applications of course material..................	x	1	2	3	4	5	x	1	2	3	4	5
Presents material with clarity..................	x	1	2	3	4	5	x	1	2	3	4	5
Speaks clearly and distinctly...............	x	1	2	3	4	5	x	1	2	3	4	5
Uses the blackboard effectively.............	x	1	2	3	4	5	x	1	2	3	4	5
Is available outside class...................	x	1	2	3	4	5	x	1	2	3	4	5
Is sensitive to students' level of understanding and is responsive to students' questions......	x	1	2	3	4	5	x	1	2	3	4	5
Has respect for students' opinions.................	x	1	2	3	4	5	x	1	2	3	4	5
Provides helpful comments on assignments...........	x	1	2	3	4	5	x	1	2	3	4	5

Which two aspects of the course and/or professor and/or tutor did you like:

(a) best:

(b) least:

5.4 Pre-Test of Microeconomics Comprehension

1. Distribute to the students the answer sheets.
2. Ask the students to complete the information section of the answer sheet.
3. Distribute to the students the Pre-Test booklets requesting that they not open them until told to do so. Then ask that they read the instructions on the first page. Explain that they have 25 minutes to complete the Test. Tell them to turn the page and begin.
4. Collect the test booklets.
5. Ask the students to check that their name and identification number are legible on the answer sheet.
6. Please collect and return the answer sheet together with the booklets.

Answer Sheet for the Pre-Test of Economics Comprehension

First name: Last name:

Please fill in the circle which you think corresponds to the correct answer. Erase completely any answer you wish to change.

1. a b c d
○ ○ ○ ○

2. a b c d
○ ○ ○ ○

3. a b c d
○ ○ ○ ○

4. a b c d
○ ○ ○ ○

5. a b c d
○ ○ ○ ○

6. a b c d
○ ○ ○ ○

7. a b c d
○ ○ ○ ○

8. a b c d
○ ○ ○ ○

9. a b c d
○ ○ ○ ○

10. a b c d
○ ○ ○ ○

11. a b c d
○ ○ ○ ○

12. a b c d
○ ○ ○ ○

13. a b c d
○ ○ ○ ○

14. a b c d
○ ○ ○ ○

15. a b c d
○ ○ ○ ○

16. a b c d
○ ○ ○ ○

17. a b c d
○ ○ ○ ○

18. a b c d
○ ○ ○ ○

19. a b c d
○ ○ ○ ○

20. a b c d
○ ○ ○ ○

21. a b c d
○ ○ ○ ○

22. a b c d
○ ○ ○ ○

23. a b c d
○ ○ ○ ○

24. a b c d
○ ○ ○ ○

25. a b c d
○ ○ ○ ○

26. a b c d
○ ○ ○ ○

27. a b c d
○ ○ ○ ○

28. a b c d
○ ○ ○ ○

29. a b c d
○ ○ ○ ○

30. a b c d
○ ○ ○ ○

31. a b c d
○ ○ ○ ○

32. a b c d
○ ○ ○ ○

33. a b c d
○ ○ ○ ○

34. a b c d
○ ○ ○ ○

35. a b c d
○ ○ ○ ○

36. a b c d
○ ○ ○ ○

37. a b c d
○ ○ ○ ○

38. a b c d
○ ○ ○ ○

39. a b c d
○ ○ ○ ○

40. a b c d
○ ○ ○ ○

41. a b c d
○ ○ ○ ○

42. a b c d
○ ○ ○ ○

43. a b c d
○ ○ ○ ○

44. a b c d
○ ○ ○ ○

45. a b c d
○ ○ ○ ○

46. a b c d
○ ○ ○ ○

47. a b c d
○ ○ ○ ○

48. a b c d
○ ○ ○ ○

49. a b c d
○ ○ ○ ○

50. a b c d
○ ○ ○ ○

1. Which of these would determine, in a market economy, how the factors of production are to be allocated among different productive activities?

   a. the exchange value of money.
   b. social custom.
   c. the needs of the managerial class.
   d. how incomes are spent.

2. Economic goods are termed scarce goods because they

   a. are not available in sufficient quantities to satisfy all wants for them.
   b. are not produced in sufficient quantities to satisfy the effective demand for them.
   c. cannot be increased in quantity to any significant extent.
   d. are of primary importance in satisfying the needs of a society

3. If consumers have budgeted a fixed amount of money to buy a certain commodity, and within a certain range of prices will spend neither more nor less than this amount on it, then their demand curve in this price range would properly be designated to be

   a. in equilibrium.
   b. perfectly elastic.
   c. perfectly inelastic.
   d. of unitary elasticity.

4. Which of the following would not cause a shift in the demand curve for peas?

   a. an increase in consumers' incomes.
   b. an increase in the price of sweet corn.
   c. a large decrease in the price of potatoes.
   d. a decrease in the price of peas.

5. "If its advocates are correct, the minimum wage bill passed this week by the House of Representatives would raise wages for nearly seven million underpaid workers over the next few years but would have no noticeable adverse effects on business, on employment, or on the price level." -- The New York Times, May 29, 1966, p. 6E. The quotation implies that the demand for the labor services of the seven million workers mentioned with respect to the price of labor services.

   a. is elastic.
   b. is inelastic.
   c. has unit elasticity.
   d. may be any of the three above.

6. If the total cost of producing 10 units is $100 and the margin cost of the eleventh unit is $21, then

   a. total variable costs of 11 units are $121.
   b. total fixed costs are $79.
   c. the marginal cost of the tenth unit is more than $21.
   d. the average total cost of 11 units is $11.

7. For a commodity produced under conditions of monopoly,

   a. marginal cost will be greater than price.
   b. marginal cost will equal price.
   c. marginal cost will be less than price.
   d. marginal cost will equal marginal revenue and average revenue.

8. Normal profits

   a. are a cost because they represent payments necessary to keep the resources which the businessman owns in his own enterprise.
   b. are not a cost because they cannot be accurately calculated.
   c. are not a cost because they accrue to the entrepreneur.
   d. are not an economic cost because they are not necessary to acquire and retain entrepreneurial ability.

9. Economic cost can best be defined as

   a. all costs exclusive of payments to fixed factors of production.
   b. compensations which must be received by resource owners to insure their continued supply.
   c. any contractual obligation to labor or material suppliers.
   d. any contractual obligation which results in a flow of money expenditures from an enterprise to resource suppliers.

10. "Price adjustments serve to keep the quantities supplied and demanded equal. If at the initial price there is excess demand, the price will rise. The price increase has two effects: it tends to shift the demand curve down because people are willing to buy a smaller quantity at a higher price and it tends to shift the supply curve because producers find it profitable to produce a greater output at a higher price. The price will adjust until there is no excess demand."

   a.. The analysis in the quotation is correct.
   b. The question confuses shifts in curves with movements along the curve.
   c. The quotation is free of logical error, but does not describe the way prices behave in actual, competitive markets.
   d. The quotation would be correct is "excess supply" were substituted for "excess demand."

11. "The price of wheat rose sharply (A) because the dry spell reduced the yield per acre and (B) because millers sought to stockpile wheat to protect themselves from future price increases that would occur if the drought were to continue." This quotation says that the price rise was due to

    a. a shift in the demand curve and a movement along the supply curve.
    b. a shift in the supply curve and a movement along the demand curve.
    c. shifts in both the demand and supply curves.
    d. other factors.

12. A shift to the left of the demand curve for X together with a shift to the right of the supply curve for X tends

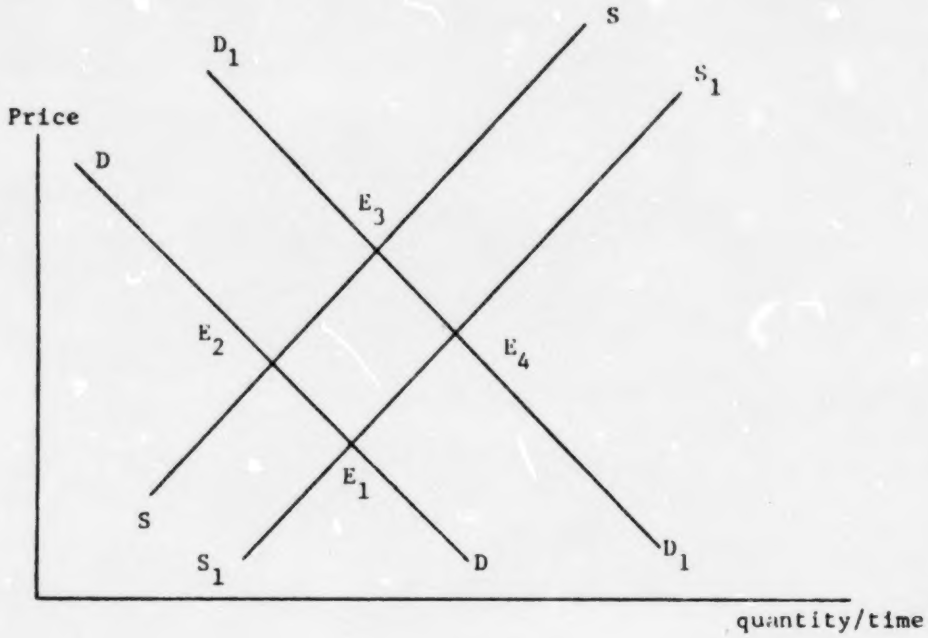
    a. to increase the price of X; the effect upon the quantity exchanged is indeterminant.
    b. to increase the price of X and to increase the quantity exchanged.
    c. to decrease the price of X and to decrease the quantity exchanged.
    d. to decrease the price of X; the effect upon quantity exchanged is indeterminant.

13. Suppose the government wants to raise money by means of per-unit commodity tax. It wants the incidence or burden of this tas to fall mainly or entirely on buyers, not suppliers. Also it wants to disturb the quantity bought and sold as little as possible. Which of the following demand or supply curves best meets these requirements?

    a. highly inelastic supply.
    b. perfectly elastic demand.
    c. perfectly elastic supply.
    d. highly inelastic demand.

14. In a perfectly competitive economy, which of the following is not a necessary condition of economic efficiency?

    a. Consumers are free to spend their income as they wish.
    b. The capital stock is increasing through investment.
    c. Each producing unit is using the method of production which yields the least cost per unit of output.
    d. Output of each product is at the point where price equals marginal cost.



15. A movement from E_2 to E_1 represents:

    a. a decrease in supply.
    b. a decrease in quantity demanded.
    c. a decrease in demand.
    d. an increase in supply.

16. A movement from E_2 to E_3 represents

    a. an increase in supply.
    b. a decrease in supply.
    c. an increase in quantity supplied.
    d. a decrease in quantity demanded.

17. A movement from E_4 to E_1 represents

    a. a decrease in demand.
    b. an increase in demand.
    c. an increase in quantity supplied.
    d. a decrease in supply.

18. Given the supply curve of lamb chops, a reduction in the price of pork chops will tend to

a. shift in the demand curve for lamb chops to the right.
b. shift in the demand curve for pork chops to the right.
c. raise the price of lamb chops.
d. lower the price of lamb chops.

The next two questions are based on the lettered sentences in the following paragraph.

A. The football stadium at XYZ University was enlarged three years ago from 30,000 to 35,000 seats.
B. Since then the stadium has never been full.
C. Tickets cost five dollars.
D. A marketing survey shows that the University's gate receipts would be lower if it charged lower prices even though the number of tickets sold would be greater.

19. What does sentence D imply about the elasticity of demand with respect to price?

a. Demand is elastic.
b. Demand is inelastic.
c. Demand is at unit elasticity.
d. It implies nothing about elasticity of demand.

20. From sentences A through D we can deduce

a. the demand curve for football seats is vertical.
b. the university is maximizing revenue.
c. seats at the football games are not economic goods.
d. none of the above.

21. During the first year that the Salk vaccine for infantile paralysis became available, the quantity produced was too small to inoculate all those in susceptible age groups. Although the cost of production and the price were not particularly high, production could not be expanded rapidly enough to meet the demand. The government therefore intervened to regulate its distribution. What do these facts suggest about the price of Salk vaccine during the first year it was available?

a. At equilibrium.
b. Above equilibrium.
c. Below equilibrium.
d. None of the above.

22. If both supply and demand rise,

a. price would usually increase and quantity sold would decrease.
b. price would increase or decrease and quantity sold would increase.
c. price would usually decrease and quantity sold would decrease.
d. price would usually increase but the quantity sold could decrease or remain unchanged.

23. If a firm finds that its Marginal Revenue exceeds its Marginal Cost, the maximum-profit rules require that firm to

a. increase its output in both perfect and imperfect competition.
b. increase its output in perfect but not necessarily in imperfect competition.
c. increase its output in imperfect but not necessarily in perfect competition.
d. decrease its output in both perfect and imperfect competition.

24. If a firm sells its product at the market price, whatever that price may be, and wants to earn as much profit as that price makes possible, it should

a. try to produce and sell that quantity of output at which Marginal Cost has risen to equality with price.
b. try to sell all the output it can produce.
c. try to produce and sell that quantity of output at which Marginal Cost has reached its minimum possible level.
d. never let Marginal Cost reach equality with price, since this is the point at which profits become zero.

25. In the long-run, if marginal cost is equal to marginal revenue, and selling price is just below total average cost, the firm will

a. leave the industry.
b. maximize profits.
c. incur losses, but continue to operate.
d. increase output.

26. In a market economy, the price system reacts to a shortage of a commodity by

a. lowering the price and profits of firms producing the commodity.
b. raising the price and producer profits.
c. lowering the price, but increasing producer profits.
d. raising the price, but lowering producer profits.

27. When there are both monopoly and competitive producers in a market economy, there will not be an efficient allocation of resources because:

    a. the monopolies will produce too little output and competitive firms will produce too much output.
    b. the prices of all goods will not reflect their marginal costs of production.
    c. even though excess profits are earned in the monopoly industries, capital is prevented from moving into those industries.
    d. all of the above.

28. Which of the following is an important function of prices in a market economy:

    a. To insure an equal distribution of goods and services.
    b. To equate quantities supplied and demanded.
    c. To ensure that all industries will be perfectly competitive in the long-run.
    d. To equate the marginal utilities of all goods consumed.

29. In November of 1958, the Illinois Central Railroad asked the Illinois Commerce Commission for permission to increase its commuter rates by 20%. The railroad argued that declining revenues made this rate increase essential. Opponents of the rate increase contended that the railroad's revenues would fall because of the rate hike. It can be concluded that:

    a. the railroad felt that the demand for passenger service was elastic and the opponents of the rate increase felt it was inelastic.
    b. the railroad felt that the demand for passenger service was inelastic and the opponents of the rate increase felt it was elastic.
    c. both groups felt that the demand was inelastic but for different reasons.
    d. both groups felt that the demand was elastic but for different reasons.

30. The rule for rational budget allocation by a consumer is that:

    a. the marginal utility of each good purchased divided by its price must be equal.
    b. the marginal utility of each good purchased multiplied by its price must be equal.
    c. the marginal utility of each good must be equal.
    d. the marginal utility of each good must be zero.

31. If the prices of commodities A, B, and C are equal, then for a consumer to be at equilibrium:

a. he must buy such quantities as to make their total utilities equal.
b. he should divide his budget equally among these commodities.
c. he should regard these commodities as providing equal satisfaction value.
d. he should buy these commodities in the quantities needed to make their marginal utilities equal.

32. In the situation of pure (or perfect) competition, the relation between market price (P) and marginal revenue (MR) for each supplying firm is this:

a. P is less than MR at all or most output levels.
b. P is greater than MR at all or most output levels.
c. P is the same as MR at all output levels.
d. P is either greater than MR or less than MR at particular output levels, but never the same as MR.

33. It will sometimes pay a firm to operate at a loss under pure competition so long as price covers:

a. average variable cost.
b. average cost.
c. marginal revenue.
d. average fixed cost.

34. If prices rise in a perfectly competitive industry, the firms in that industry in the short-run will:

a. not increase in number.
b. try to increase production.
c. bid for more resources.
d. all of the above.

35. A firm is operating at minimum cost for the particular quantity of output it is producing (whether that output is the maximum-profit output or not) whenever:

a. the price of each input employed is equal to the firm's marginal cost.
b. marginal-physical-products of all inputs employed are equal.
c. the total quantities of all inputs employed are in proportion to the marginal-physical-products of these inputs.
d. the marginal-physical-products of all inputs employed are proportional to their prices.

36. A consumer's demand curve for any given commodity is most likely to shift to the right (or upward) with:

a. a rise in the price of substitutes, or a fall in the price of complements.
b. a rise in the price of either substitutes or complements.
c. a fall in the price of substitutes, or a rise in the price of complements.
d. a fall in the price of either substitutes or complements.

37. The following is a complete and correct definition of the demand curve for commodity X. It shows, for a given market:

a. how much of X would be bought at the equilibrium price.
b. how, as people's incomes rise and they have more money to spend, their purchases of X would increase, and by how much.
c. how the amount of money people spend to purchase X changes as the price they must pay for it changes.
d. the amounts of X that would be bought each period, at each and any price, assuming other factors influencing demand (income, tastes, etc.) remain constant.

38. If marginal cost is above average total cost, then:

a. average total cost must be falling.
b. average fixed cost must be rising.
c. average variable cost must be falling.
d. average total cost must be rising.

39. An individual shifts to a new equilibrium position as a result of some change either in prices or in his income. He finds that in his new equilibrium situation, marginal utilities are all lower than they were in the old situation. This means that:

a. he is definitely worse off in his new situation.
b. he is definitely better off in his new situation.
c. he is definitely worse off than in his old situation if his income has changed, but not otherwise.
d. he is definitely better off than in his old situation if prices have changed, but not otherwise.

40. A monopoly finds that at its present level of output and sales marginal revenue equals $5 and average variable cost, which is at a minimum, is $4.10. To maximize profits, the firm should:

a. leave price and output unchanged.
b. increase price and leave output unchanged.
c. decrease price and increase output.
d. increase price and decrease output.

41. When a competitive firm has reached a level of output at which the marginal-revenue-product of each input employed is equal to the price of that input, it:

a. is producing that output at least possible cost, but is not necessarily at maximum-profit output level.
b. is at its maximum-profit output level, but is not necessarily producing that output at least possible cost.
c. is at maximum-profit output level and is producing that output at least possible cost.
d. is not necessarily either at maximum-profit level of output or at least possible cost for that output.

42. The profit-maximizing rule for a firm in pure (or perfect) competition is: price equal to Marginal Cost. The meaning of this rule is:

a. keep increasing quantity of output (Q) until price (P) has risen to equality with Marginal Cost (MC).
b. keep increasing Q until P has fallen to equality with MC.
c. keep increasing q until MC has fallen to equality with P.
d. keep increasing Q until MC has risen to equality with P.

43. The long-run supply curve of a competitive industry is:

a. the horizontal summation of the long-run marginal cost curves of all firms in the industry.
b. the horizontal summation of the long-run marginal cost curves above the average cost curves of all firms in the industry.
c. the horizontal summation of the long-run average cost curves of all firms in the industry.
d. none of the above.

44. The short-run supply curve of a firm in perfect competition is:

a. the rising segment of its short-run marginal cost curve.
b. the rising segment of its short-run average variable cost curve.
c. the rising segment of its short-run average fixed cost curve.
d. the rising segment of its short-run marginal cost curve above its average variable cost curve.

45. When production is being carried on under conditions of diminishing returns -- but total product is still increasing -- then, in the short-run, in order to obtain successive increases in output of 1 extra unit:

a. smaller and smaller amounts of the variable input will be needed.
b. adding more of the variable input will do more harm than good, because it must diminish total output instead of increasing it.
c. the cost of hiring each additional unit of the variable input must steadily increase.
d. greater and greater amounts of the variable input will be needed.

46. At the quantity of output where Average Cost has reached its minimum level:

a. average variable cost will equal fixed cost.
b. profit must be at its maximum level for the firm.
c. marginal cost will equal average variable cost.
d. marginal cost will equal average cost.

47. Which of the following cannot be true? As output rises:

a. average variable cost rises.
b. total cost rises.
c. average fixed cost rises.
d. average total cost rises.

48. In long-run equilibrium under monopoly marginal cost will equal:

a. price.
b. average cost.
c. average revenue.
d. marginal revenue.

49. If a single firm in pure competition lowers its price below the equilibrium market price:

a. It would get a larger share of the market.
b. It would not maximize profit.
c. Other firms would lower their prices too.
d. Other firms would be driven out of the industry.

50. If one wheat farmer attempted to charge prices higher than his competitors, he would lose all his sales because:

a. other producers would retaliate.
b. buyers would recognize the superiority of his high-priced goods.
c. the outputs of other producers are perfect substitutes for his goods.
d. of the law of demand.

5.5

Answer Sheet for Pre-Test of Mathematics Comprehension

1-2

Last name: First name:

8-14

Student Number: ☐☐☐☐☐☐☐

10-93

Please fill in the circle which you think corresponds to the correct answer. Erase completely any answer you wish to change.

	1	2	3	4
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○
21.	○	○	○	○
22.	○	○	○	○
23.	○	○	○	○
24.	○	○	○	○
25.	○	○	○	○
26.	○	○	○	○
27.	○	○	○	○
28.	○	○	○	○

SURVEY 0

Some Basic Tools and Terminology in the Study of Economics

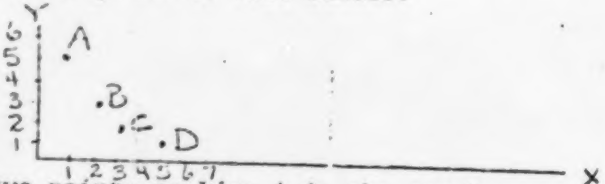
Name: ______________________ Student Number: ______________

Select the best answer from the alternatives given. Place the number of the correct answer in the blank at the left.

Reading a Graph and Some Basic Terminology

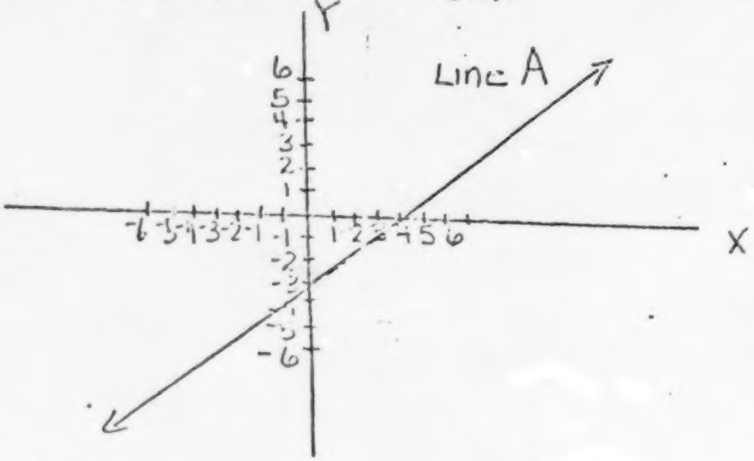
_____1. In the graph the point (1,5) corresponds to what letter?

1) A
2) B
3) C
4) D

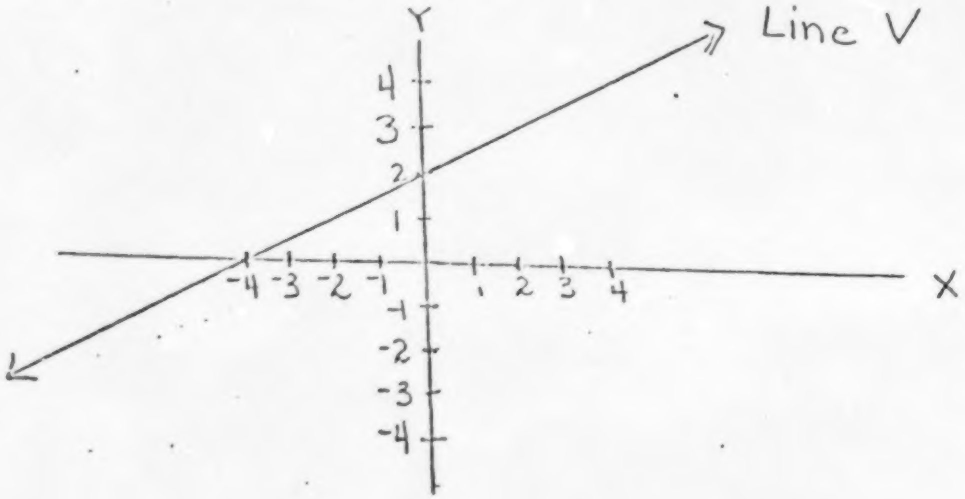


_____2. Identify the coordinates of two points on Line A in the graph at the right.

1) (4,0); (-3,0)
2) (4,0); (0,-3)
3) (-3,0); (0,4)
4) (0,4); (0,-3)



Answer the next three questions on the basis of this graph:



_____3. Identify the x-intercept of Line V.

1) 0
2) -4
3) 2
4) 4

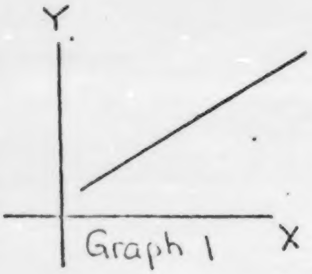
_____4. Identify the y-intercept of Line V.

1) 2
2) -4
3) 0
4) -2

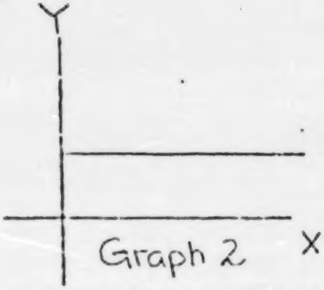
_____5. Calculate the slope of Line V.

1) 1/2
2) -1/2
3) 2/1
4) -2/1

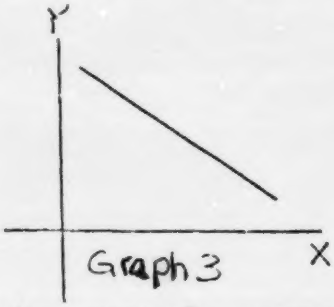
Answer the next three questions on the basis of the following graphs:



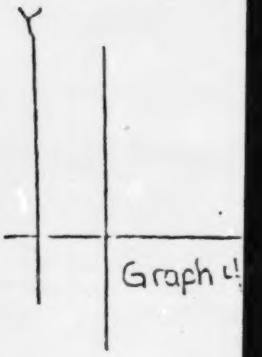
Graph 1



Graph 2



Graph 3



Graph 4

_____6. The amount of y does not depend upon the amount of x in graph:
1) 1
2) 2
3) 3
4) 4

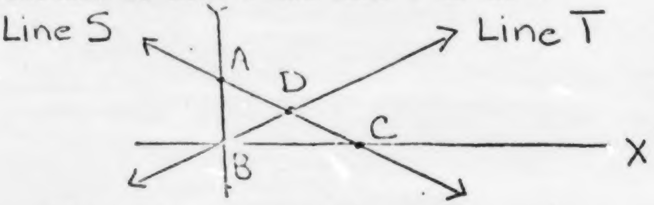
_____7. The amount of y is directly or positively related to the amount of x in graph:

1) 1
2) 2
3) 3
4) 4

_____8. The amount of y is inversely or negatively related to the amount of x in graph:

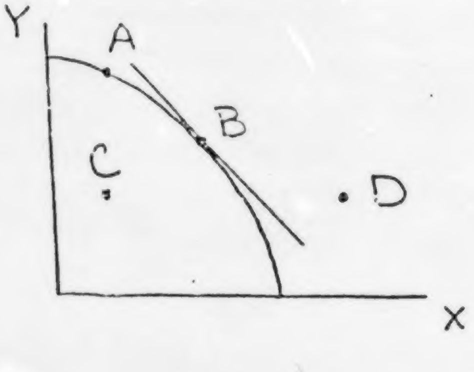
1) 1
2) 2
3) 3
4) 4

_____9. What is the point of intersection of Line S and Line T in the graph at the right?



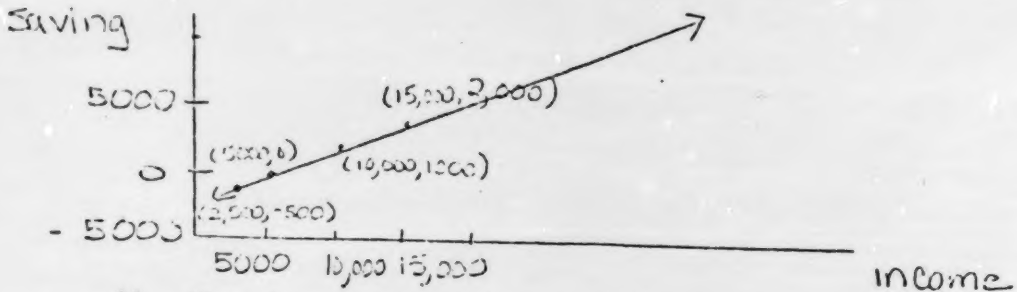
1) A
2) B
3) C
4) D

_____10. In the graph to the right, which point corresponds to a point of tangency?



1) A
2) B
3) C
4) D

Answer the next five questions on the basis of this graph:



_____11. When income increases, saving:

1) decreases
2) remains the same
3) increases
4) saving and income are not related

_____12. When income decreases, saving:

1) decreases
2) remains the same
3) increases
4) saving and income are not related

_____13. The relation between income and saving is called:

1) inverse or negative
2) direct or positive
3) parallel to one axis
4) direct or negative

_____14. If income were $20,000, saving would be

1) $1250
2) $1500
3) $2500
4) $3000

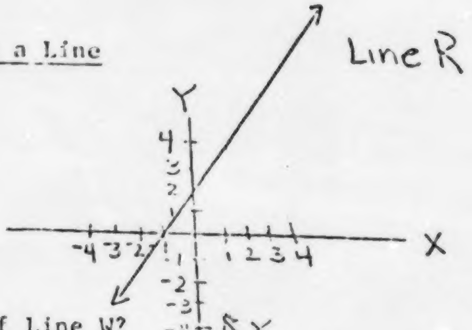
_____15. The slope of the line relating saving and income is:

1) 5/1
2) 1/5
3) -5/1
4) -1/5

Graphs and the Equation for a Line

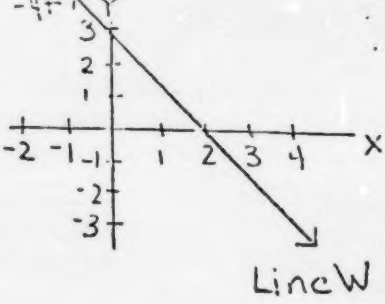
_____16. Identify the equation of Line R.

1) $y = 2 + x$
2) $y = 1 + (1/2)x$
3) $y = 2 + 2x$
4) $y = -1 + (1/2)x$


Line R
Y
4
3
2
1
X
-4 -3 -2 -1
1 2 3 4
-2
-3
-4

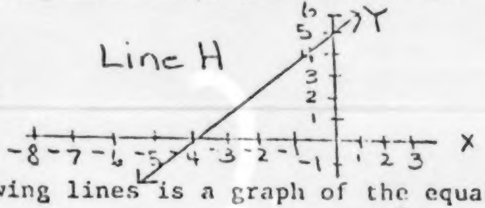
_____17. Which of the following is the equation of Line W?

1) $y = 6 - 3x$
2) $y = -3 - (3/2)x$
3) $y = (4/3) - (2/3)x$
4) $y = 3 - (3/2)x$


Y
3
2
1
X
-2 -1
-1
1 2 3 4
-2
-3
Line W

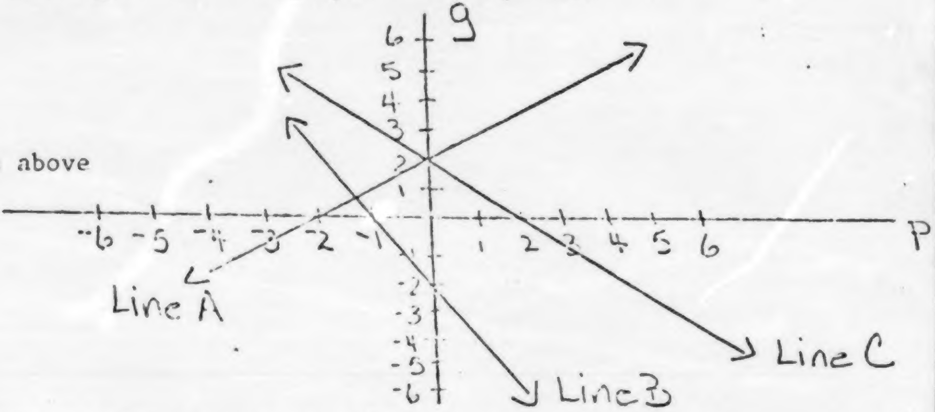
_____18. Which of the following is the equation of Line H?

1) $y = (5/4)x + 5$
2) $y = (4/5)x - 4$
3) $y = 5 + (4/5)x$
4) $y = 4 + (5/4)x$


Line H
Y
6
5
4
3
2
1
X
-8 -7 -6 -5 -4 -3 -2 -1
-1
1 2 3

_____19. Which of the following lines is a graph of the equation $g = 2 - p$?

1) Line A
2) Line B
3) Line C
4) None of the above


g
6
5
4
3
2
1
P
-6 -5 -4 -3 -2 -1
1 2 3 4 5 6
-2
-3
-4
-5
-6
Line A
Line B
Line C

Answer the next three questions on the basis of this linear equation: $y = 3 - (3/5)x$

_____20. The numerical value of the y-intercept is:

1) 0
2) 5
3) 3
4) 3/5

_____21. The numerical value of the slope is:

1) 5/3
2) -5/3
3) 3/5
4) -3/5

______22. The numerical value of the x-intercept is:

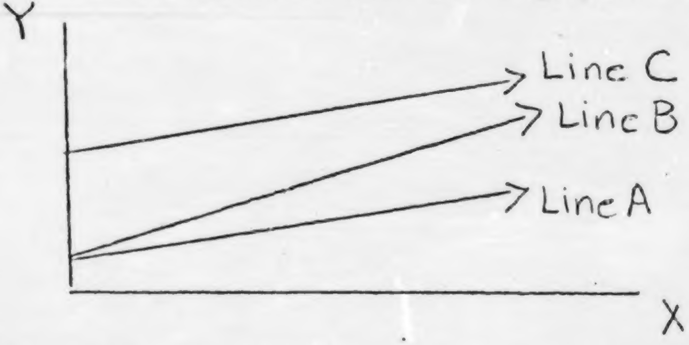
1) 0
2) 5
3) 3
4) 3/5

Basic Albebra of Intersecting and Non-Intersecting Lines

______23. Solve for "m" in the linear equation 9 +(4/7)m = 12

1) 3
2) 5
3) 12/7
4) 21/4

Answer the next two questions on the basis of the graph to the right:



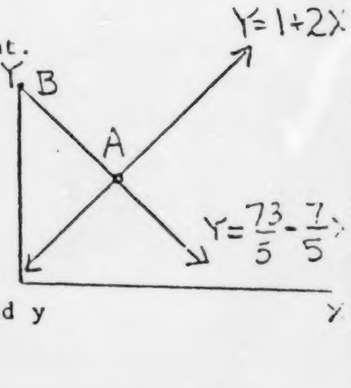
______24. A movement from Line A to Line B involves what changes?

1) a change in the slope only
2) a change in the intercept only
3) a change in both the slope and the intercept
4) neither a change in the slope nor the intercept

______25. A movement from Line A to Line C involves what changes?

1) a change in the slope only
2) a change in the intercept only
3) a change in both the slope and the intercept
4) neither a change in the slope nor the intercept

Answer the next two questions on the basis of the graph to the right.



______26. The solution of the two intersecting lines is:

1) y = 1 + 2x
2) y = 15 - 5x
3) Point A
4) Point B

______27. In the graph for question 26, what are the values of x and y at point A?

1) x = 5; y = 11
2) x = 16/3; y = 35/3

_____28. Solve the following equations simultaneously for x and y:
$y = -37 + 5x$ $y = 15 - (3/2)x$

1) $x = 141/17$; $y = 76/17$
2) $x = 94/13$; $y = -11/13$
3) $x = 8$; $y = 3$
4) $x = 3$; $y = 8$

5.6 Psychological Inventory

Test Administration Instructions

1 Distribute to the students the Psychological Inventory booklets and the corresponding answer sheets.

2 Ask the students to complete the information section of the answer sheet and read the instructions on the front of the booklet.

3 Inform the students that this is merely an attempt to measure positive character traits; it is NOT a test. The questions should be answered honestly without deliberation. All information will be kept strictly confidential.

4 The Inventory will require approximately 15 minutes for completion.

5 Collect the Inventory booklets.

6 Ask the students to check that their name and identification number are legible on the answer sheet.

7 Please collect and return the answer sheets together with the booklets.

NAME: ____________________ AGE: ________ SEX: ________

(please print)

INSTITUTION: ____________________

Directions: Be sure to fill in your name and other information requested. Then answer TRUE (T) or FALSE (F) for each statement by putting an X on the appropriate circle as in the example shown at the right.

T	F
⊗	○

	T	F
1.	○	○
2.	○	○
3.	○	○
4.	○	○
5.	○	○
6.	○	○
7.	○	○
8.	○	○
9.	○	○
10.	○	○
11.	○	○
12.	○	○
13.	○	○
14.	○	○
15.	○	○
16.	○	○
17.	○	○
18.	○	○
19.	○	○
20.	○	○
21.	○	○
22.	○	○
23.	○	○
24.	○	○
25.	○	○
26.	○	○
27.	○	○
28.	○	○
29.	○	○
30.	○	○
31.	○	○
32.	○	○
33.	○	○
34.	○	○
35.	○	○
36.	○	○
37.	○	○
38.	○	○
39.	○	○
40.	○	○
41.	○	○
42.	○	○
43.	○	○
44.	○	○
45.	○	○
46.	○	○
47.	○	○
48.	○	○
49.	○	○
50.	○	○
51.	○	○
52.	○	○
53.	○	○
54.	○	○
55.	○	○
56.	○	○
57.	○	○
58.	○	○
59.	○	○
60.	○	○
61.	○	○
62.	○	○
63.	○	○
64.	○	○
65.	○	○
66.	○	○
67.	○	○
68.	○	○
69.	○	○
70.	○	○
71.	○	○
72.	○	○
73.	○	○
74.	○	○
75.	○	○
76.	○	○
77.	○	○
78.	○	○
79.	○	○
80.	○	○
81.	○	○
82.	○	○
83.	○	○
84.	○	○
85.	○	○
86.	○	○
87.	○	○
88.	○	○
89.	○	○
90.	○	○
91.	○	○
92.	○	○
93.	○	○
94.	○	○
95.	○	○
96.	○	○
97.	○	○
98.	○	○
99.	○	○
100.	○	○
101.	○	○
102.	○	○
103.	○	○
104.	○	○
105.	○	○
106.	○	○
107.	○	○
108.	○	○
109.	○	○
110.	○	○
111.	○	○
112.	○	○
113.	○	○
114.	○	○
115.	○	○
116.	○	○
117.	○	○
118.	○	○
119.	○	○
120.	○	○
121.	○	○
122.	○	○
123.	○	○
124.	○	○
125.	○	○
126.	○	○
127.	○	○

1 The only interesting part of the newspaper is the "comic strips."

2 I looked up to my father as an ideal man.

3 Our thinking would be a lot better off if we would just forget about words like "probably", "approximately", and "perhaps."

4 I have a very strong desire to be a success in the world.

5 I liked "Alice in Wonderland" by Lewis Carroll.

6 I usually go to the cinema more than once a week.

7 I have had very peculiar and strange experiences.

8 I am often said to be hotheaded.

9 I gossip a little at times.

10 When I was going to school I played truant quite often.

11 I have very few fears compared to my friends.

12 For most questions there is just one right answer, once a person is able to get all the facts.

13 I think I would like the work of a school teacher.

14 When someone does me a wrong I feel I should pay the person back if I can, just for the principle of the thing.

15 I seem to be about as capable and bright as most others around me.

16 I usually take an active part in the entertainment at parties.

17 The trouble with many people is that they don't take things seriously enough.

18 It is always a good thing to be frank.

19 A thunderstorm terrifies me.

20 I often feel as if the world were just passing me by.

21 People often expect too much of me.

22 When in a group of people I have trouble thinking of the right things to talk about.

23 It is annoying to listen to a lecturer who can not seem to make up his or her mind as to what he or she really believes.

24 I don't blame anyone for trying to grab all he or she can get in this world.

25 Planning one's activities in advance is very likely to take most of the fun out of life.

26 I was a slow learner in school.

27 I like poetry.

28 People who seem unsure and uncertain about things make me feel uncomfortable.

29 There is something wrong with a person who can't take orders without getting angry or resentful.

30 Sometimes without any reason or even when things are going wrong I feel excitedly happy, "on top of the world."

31 I wake up fresh and rested most mornings.

32 Most people make friends because friends are likely to be useful to them.

33 It is all right to get around the law if you don't actually break it.

34 Parents are much too easy on their children nowadays.

35 I have a tendency to give up easily when I meet difficult problems.

36 I certainly feel useless at times.

37 I read at least ten books a year.

38 I have the wanderlust and am never happy unless I am roaming or travelling about.

39 I am sometimes cross and grouchy without any good reason.

40 My parents have often disapproved of my friends.

41 Teachers often expect too much work from the students.

42 My way of doing things is apt to be misunderstood by others.

43 I have had blank spells in which my activities were interrupted and I have not known what was going on around me.

44 I have had more than my share of things to worry about.

45 I am quite often not in on the gossip and talk of the group to which I belong.

46 I like to keep people guessing what I am going to do next.

47 I think I would like to fight in a boxing match sometime.

48 In a group of people I would not be embarrassed to be called upon to start a discussion or give an opinion about something I know well.

49 If given the chance I would make a good leader of people.

50 I like to plan a schedule for study at home and then follow it.

51 I enjoy a race or game better when I bet on it.

52 I have often found people jealous of my good ideas, just because they had not thought of them first.

53 In school I was sometimes sent to the headmaster for misbehaving.

54 People pretend to care more about one another than they really do.

55 I like to read about history.

56 I am so touchy on some subjects that I can not talk about them.

57 The future is too uncertain for a person to make serious plans.

58 I like to talk before groups of people.

59 The person who provides temptation by leaving valuable property unprotected is about as much to blame for its theft as the one who steals it.

60 I am often bothered by useless thoughts which keep running through my mind.

61 I like to plan out my activities in advance.

62 I must admit I find it very hard to work under strict rules and regulations.

63 I like large, noisy parties.

64 I sometimes feel that I am a burden to others.

65 Only a fool would try to change our British way of life.

66 In school I found it very hard to talk before the class.

67 I always try to do at least a little better than what is expected of me.

68 Lawbreakers are almost always caught and punished.

69 I would be very unhappy if I were not successful at something I had seriously started to do.

70 I dread the thought of an earthquake.

71 I like science.

72 I often lose my temper.

73 My parents were always very strict and stern with me.

74 I am bothered by people outside, on buses, in shops, etc. watching me.

75 I often get disgusted with myself.

76 Society owes a lot more to the businessman and the manufacturer than it does to the artist and the professor.

77 I like to read about science.

78 I have never been in trouble because of my sex behaviour.

79 I think I would like to belong to a motor cycling club.

80 I used to like it very much when one of my papers was read to the class in school.

81 I feel that I have often been punished without cause.

82 I often get feelings like crawling, burning, tingling, or "going to sleep" in different parts of my body.

83 I don't seem to care what happens to me.

84 I often wish people would be more definite about things.

85 It is annoying to listen to a lecturer who cannot seem to make up his or her mind as to what he or she really believes.

86 I find that a well-ordered mode of life with regular hours is congenial to my temperament.

87 It is hard for me to sympathise with someone who is always doubting and unsure about things.

88 I often start things I never finish.

89 I work under a great deal of tension.

90 Our thinking would be a lot better off if we would just forget about words like "probably", "approximately", and "perhaps."

91 I never make judgements about people until I am sure of the facts.

92 I must admit I have no great desire to learn new things.

93 A strong person will be able to make up his or her mind even on the most difficult questions.

94 I seldom worry about my health.

95 For most questions there is just one right answer once a person is able to get all the facts.

96 I like to have a place for everything and everything in its place.

97 I have never seen a vision.

98 I don't like to work on a problem unless there is the possibility of coming out with a clear-cut and unambiguous answer.

99 It bothers me when something unexpected interrupts my daily routine.

100 The future seems hopeless to me.

101 I have had no difficulty starting or holding my urine.

102 Most of the arguments or quarrels I get into are over matters of principle.

103 I am known as a hard and steady worker.

104 Success is a matter of will power.

105 I don't like things to be uncertain and unpredictable.

106 I get pretty discouraged with the law when a clever lawyer gets a criminal free.

107 I am quite a fast reader.

108 I daydream very little.

109 Once I have my mind made up I seldom change it.

110 At times I have been so entertained by the cleverness of a crook that I have hoped he would get away with it.

111 I think I am more strict about right and wrong than most people.

112 I have had attacks in which I could not control my movements or speech, but in which I knew what was going on around me.

113 I am in favour of a very strict enforcement of all laws, regardless of the consequences.

114 I have had no difficulty in starting or holding my bowel movement.

115 I always see to it that my work is carefully planned and organised.

116 I do not read every editorial in the newspaper every day.

117 Any job is all right with me, so long as it pays well.

118 It often seems that my life has no meaning.

119 I feel like giving up quickly when things go wrong.

120 If people had not had it in for me I would have been much more successful.

121 I am not afraid of picking up a disease or germs from doorknobs.

122 It is more important that a father be kind than that he be successful.

123 My skin seems to be unusual sensitive to touch.

124 I have often been frightened in the middle of the night.

125 The trouble with most people is that they don't take things seriously enough.

126 I become irritated by writers who go out of their way to use strange and unusual words.

127 I set a high standard for myself and I feel others should do the same.

5.7 Final Examination - Microeconomics

Section A - Objective Questions

Answer all questions.

1. The real cost to society of building a new school is

   a. the other desirable goods that could have been produced instead of the new school
   b. the money spent for the new school
   c. the taxes necessary to pay for the new school
   d. the other goods that teachers could produce if employed elsewhere

2. A consumer's demand curve typically is downward sloping to the quantity axis for which of the following reasons?

   1. At lower prices, the good in question is substituted for other goods that are now relatively more expensive.

   2. At lower prices, the consumer can buy all he bought at the higher prices and with the money left over buy still more.

      a. 1 only
      b. 2 only
      c. Both 1 and 2
      d. Neither 1 nor 2

3. A family will be away from its house for six months. The monthly mortgage payment on the house is $300. The local services, to be paid by the owner, cost $60 per month if the house is occupied; otherwise 0. If the family wishes to minimize its losses (or maximize its gains) from the house, it should rent for as much as the market will bear as long as monthly rent is above the following. (Assume wear and tear, etc., to be zero whether or not the house is occupied.)

   a. $0
   b. $60
   c. $300
   d. $360

4. In travelling about a city most people use either subway or bus. Suppose all subway fares were doubled, while bus fares remained unchanged. How would the subway fare increase affect fare revenue?

   a. It would increase for buses but might increase or decrease for subways
   b. It would increase for subways but might increase or decrease for buses
   c. It would increase for both subways and buses
   d. It would increase for subways and remain unchanged for buses

5. As compared to a direct social security payment, how would you evaluate the provision of below-cost public housing to poor persons from the point of view of satisfying consumers' wants?

   a. It is more efficient because it gives low income persons what they need
   b. It is less efficient because it will result in too much housing and too little of the other things consumers want
   c. It is more efficient because it cannot be spent on undesirable goods such as tobacco and drink
   d. It is less efficient because the government cannot manage housing efficiently.

6. In a fully employed economy some workers are unable to earn the $5000 per annum considered to be that income necessary to maintain minimal acceptable living standards for an average family. To combat such poverty two different schemes have been proposed:

   1. The government makes up any difference between income and $5000 with a cash payment.

   2. The government pays $5000 to all families earning less than $5000 but taxes earned income at 30%.

   What would be the effects of these two proposals?

   a. 1 would result in greater work effort by the poor than would 2
   b. 2 would result in certainly no less and possibly greater work effort by the poor than would 1
   c. Both 1 and 2 would result in an equal increase in work effort by the poor
   d. Neither 1 nor 2 provides any incentives to work at all for individuals earning less than $5000 per annum

Questions 7 and 8 are based on the following information.

Every night 20 heavy trucks disturb the residents of a town situated near a freeway. No other vehicle causes a noise problem. Fitting a $10 muffler to every truck is the only way to eliminate the noise problem. The life of each muffler is one year. The residents of the town collectively decided that getting rid of the truck noise was worth more than $200 per year, though it was not worth $200 to any individual family.

7. To achieve economic efficiency which of the following should occur?

   a. The mufflers should be fitted and the truck company should pay
   b. The mufflers should be fitted and the residents should pay
   c. The mufflers should be fitted and the costs divided
   d. The mufflers should be fitted but who should pay is not a question of economic efficiency.

8. Assuming that the truck company acts to maximize profit and each household acts to maximize its own welfare, a private firm still could not make a profit from selling mufflers (either to individual households to give to the truck company or to the truck company itself) for which of the following reasons?

   1. In pursuit of profit the truck company would not take all costs into account.

   2. The householders that might purchase mufflers would not be able to charge other households.

   3. The continued existence of the noise suggests that the benefit and/or the cost calculations were inaccurate.

      a. 1 only
      b. 2 only
      c. 1 and 2 only
      d. 3 only

9. Yoyos are produced by many competing firms. At present levels of production, costs per yoyo would increase if output increased. If a profit maximizing monopolist were to buy out all the present producers, how would the quantity produced compare with output under competitive conditions?

   a. The quantity produced by the monopolist would be lower
   b. The quantity produced by the monopolist would be the same
   c. The quantity produced by the monopolist would be higher
   d. The relative quantity that would be produced by the monopolist cannot be determined from the available information

10. If, because of continued U.S. balance of payments surpluses, it was decided to revalue the dollar upwards, what would be the effect on U.S. residents if no other country made any changes?

    1. A vacation in Europe would cost less.

    2. Imported goods would become cheaper.

       a. 1 only
       b. 2 only
       c. Both 1 and 2
       d. Neither 1 nor 2

11. Favourable weather conditions have increased the Brazilian coffee crop this year. A Brazilian economist recommended that sufficient coffee be destroyed to keep the price of coffee from falling. What must be the effect of adopting the economist's proposal?

    1. A reduction in world real income

    2. A reducation in Brazilian real income

    3. A reduction in Brazilian coffee growers' real income

       a. 1 only
       b. 1 and 2 only
       c. 1 and 2 and 3
       d. Neither 1 nor 2 nor 3

Questions 12 and 13 are based on the following information.

In an economy where there is unrestricted competition in all markets, coal is the primary source of heat for most households. Suppose a supply of natural gas which can provide heat at a much lower cost is discovered.

12. Assuming the cost per ton of coal increases as the coal industry output increases, what effect will the discovery have on the price of coal and the quantity of coal produced?

a. Price will increase; quantity will decrease
b. Price will decrease; quantity will decrease
c. Price will decrease; quantity will increase
d. Price will increase; quantity will increase

13. Which of the following changes in the distribution of real income will result from the discovery?

1. The real income of employees in the natural gas industry will fall relative to the average

2. The real income of coal miners will fall relative to the average

3. The real income of residents in colder districts will rise relative to the average

a. 1 and 3 only
b. 2 and 3 only
c. 3 only
d. 1, 2 and 3

14. If, for a manufactured commodity, a monopolist were allowed to charge that price which maximized profit, which of the following would be true?

1. The price would not equal the cost of the last unit produced

2. The revenue received from the last unit produced would equal the cost of producing that unit

3. Total revenue (price x quantity) for the monopolist would not be maximum.

a. 2 only
b. 1 and 2 only
c. 2 and 3 only
d. 1, 2 and 3

15. A launderette operator discovers that at his present level of operation the installation of an additional washing machine will increase output by 20%, the installation of an additional drier will increase output by 10%, and the installation of both will increase output by 30%. The washing machine costs $100 and the drier $40. To maximize profit what should the launderette operator do? He should

a. instal only the washing machine
b. instal only the drier
c. instal both the washing machine and the drier
d. nor necessarily instal either the washing machine or the drier or both

16. Suppose that it is true that the world prices of agricultural commodities are unaffected by the quantities demanded and supplied by any one country and that each commodity is indistinguishable by country of origin. Furthermore, each country's market prices equal world prices. For certain agricultural products the government pays U.S. farmers guaranteed prices which exceed market prices. If all such subsidies were discontinued which of the following would be expected to occur at full employment?

1. The U.S. market prices for these commodities would rise

2. There would be a decrease in the U.S. standard of living

3. There would be an increase in U.S. agricultural imports

a. 1 only
b. 1 and 2 only
c. 3 only
d. 1 and 2 and 3

17. This question is based on the following hypothetical statement:

"An electrical power utility requests that the Federal Power Commission (FPC) approve an increase in rates for electricity in order to increase its revenues to overcome falling profits. The FPC disapproves the increase and suggests that the utility would do better if it reduced its rates."

On the basis of the above statement, which of the following is true?

1. The utility will not be able to increase its revenues, because it cannot raise its rates.
2. The utility believes the demand for power is inelastic; the FPC believes demand is elastic.
3. The utility believes the demand for power is elastic; the FPC believes demand is inelastic.

a 1 only
b 2 only
c 3 only
d Neither 1 nor 2 nor 3

Section B - Case Questions

Answer only one question

Case 1 - Gasoline Rationing versus the Free Market

Consider the following hypothetical situation: The mayor of a small town sent the following letter to the President of the United States recommending a solution to the gasoline shortage.

Dear Mr. President,

As you know, I have strong objections to anything that interferes with the free functioning of the marketplace. Your proposal to tax petroleum constitutes such an interference. Your opponent's proposal to ration gasoline involves even more interference with market forces. The outcome of such a scheme, if it were adopted, would be black markets and all the concomitant waste of resources associated with such markets.

The real point, of course, is that there is no gasoline shortage, just as there is no shortage of Mercedes', diamonds, or Scotch whisky. The fact that the price of an item has risen significantly does not imply a shortage. In a market economy, a shortage can only arise when an all-powerful body like the government sets a price below the equilibrium market price. Since I am sure, Mr. President, you would never contemplate establishing regulated prices for all commodities we consume, I urge that gasoline be treated like any other commodity. In short, the problem disappears when market forces are allowed to operate unhindered by government intrusion.

Sincerely yours,

Twist V. D. Baer
Mayor

The President's economic adviser sent the following reply:

Dear Mayor Baer,

The President has asked me to reply to your interesting letter. An official report analyzing the advantages and disadvantages of each of the three proposals you discuss is being prepared by Dr. Denniswood. We will forward a copy to your office shortly and look forward to your reaction.

Sincerely,

Con Johnlisk

What would you say in the report if you were Dr. Denniswood as to the relative merits in terms of economic efficiency of the three policies - a tax on gasoline, rationing of gasoline, and letting the market for gasoline operate freely?

Case 2 - Pollution and the Prima Paper Company

In 1940, Prima Paper Company opened a pulp and paper mill on the Big Walnut River, 30 miles south of Columbus, Ohio. The company originally employed 200 workers from surrounding towns, and as the mill grew, a town Stafford sprung up around it. In 1950, the mill employed 450 workers while Stafford's population was 2,500 with virtually all the working townspeople employed directly or indirectly by the mill. By 1970 the town had grown to 10,000 and the 500 workers in the mill represented only about 18% of the town's work-force. The mill was no longer the only employer in town.

Prima originally had chosen its mill location because it was central to supplies and markets and because the Big Walnut was a swift-moving wide river passing through relatively unpopulated regions - well suited for disposal of process wastes. But by the 1970s the town had grown up, even downstream from the mill. In 1972, a group of residents brought a suit against Prima Paper Company to enjoin them from dumping effluent into the river.

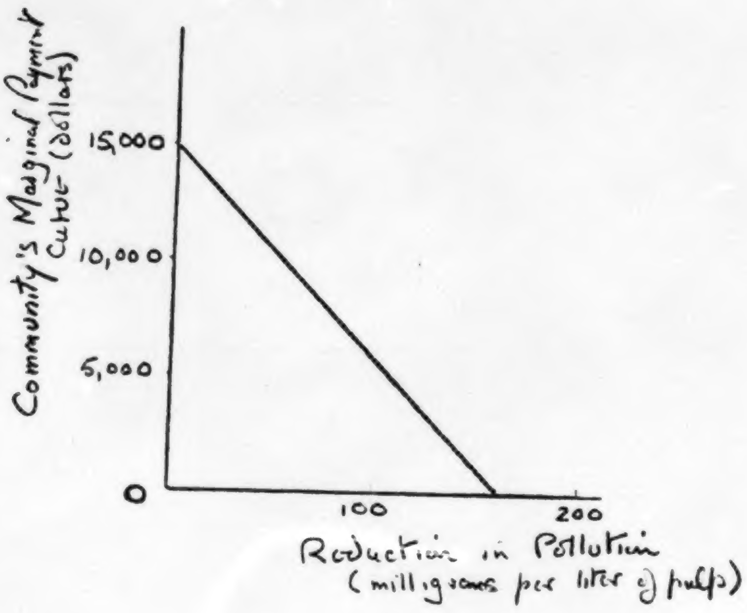
As a "friend of the Court" you are asked to analyze the situation. You are presented with the following facts that the Court has found to be true, and you are to use these facts as a basis for your analysis.

1. The present level of pollution is 160 milligrams per liter of pulp and unless some antipollution measure is adopted, pollution will continue at this level indefinitely. It also has been established that level of pollution per liter is independent of the level of production of the plant.

2. The only feasible method of reducing pollution is to instal a waste treatment plant downstream from the mill. Fixed costs are $400,000 and variable costs are $6,000 for each milligram of pollutants per liter of pulp removed from the river.

3. A study of residents' attitudes regarding the mill's pollution indicates that the community would be willing to pay according to the curve shown in Figure 2.1 to reduce pollution.

Figure 2.1



Note that the curve represents a marginal payment schedule. If the company were to reduce pollution by 10 milligrams per liter, the payment would be $15,000 for the first milligram, $14,900 for the second, and so on. The total payment would be the area under the curve between 0 and the level of pollution reduction.

If the community were to subsidize the company for reducing pollution according to this schedule, what would be the profit-maximizing level of pollution? In what sense would this level of pollution be the efficient level of pollution? Would it be efficient to force the company to reduce pollution to zero? If the Court decided to reduce pollution by charging the company an effluent fee, what marginal fee schedule would reflect accurately the damage to the community from pollution? How would this policy differ from the subsidy scheme with respect to the distribution of benefits from pollution reduction between the Prima Paper Company and the community?

Section C - Essay Questions

Answer only one question

1. A visitor from Mars, where goods, services, jobs, wives, football tickets, etc., are allocated by their ageless king, visits Earth and asks you to introduce him to the Earth allocative king. You begin "It's like this, you see.....". Continue.

2. "The price system works well in normal times but breaks down under stress of war or other upheavals." Discuss.